AMERICAN ARTISAN

ARM AIR HEATING • SHEET METAL
ONTRACTING • AIR CONDITIONING

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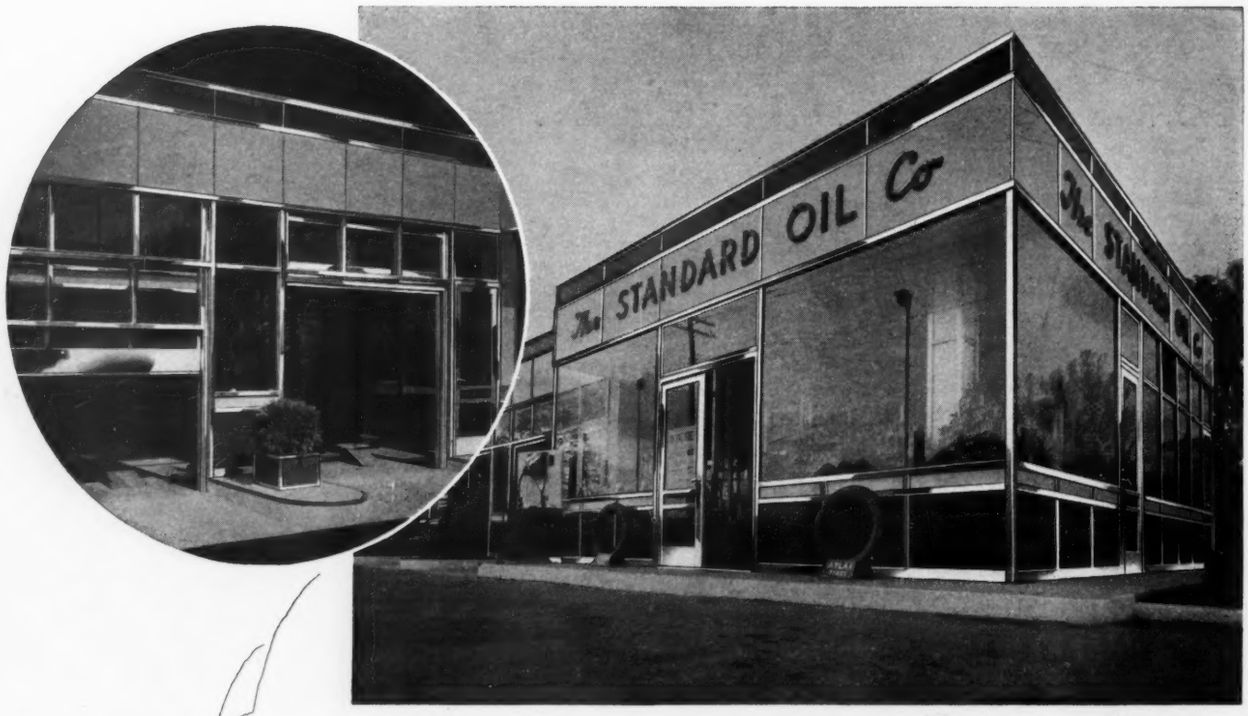
APRIL
1933

ENDURO UNCOVERS *New* SALES POSSIBILITIES



One of a number of Standard Oil Co. of Ohio (Sohio) Stations using ENDURO *for all the vertical and horizontal members of the building frame and inside columns and partitions, and for the counters. Much credit for this striking display and service building is due the E. F. Hauserman Co., Cleveland, Ohio, who helped design it and who fabricated the* ENDURO *sections.*

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ENDURO is a lifetime metal. For decoration it is ideal for store fronts, balconies, marquees, grills, displays of all kinds, theatre entrance trim and hundreds of similar applications. For utility it cannot be equalled as a material for food handling equipment, chemical plant apparatus, vats, pans and containers of many varieties used in industry. Because it offers complete immunity from rust, stain and tarnish, it can be used inside or outside. It stays bright indefinitely. And it is easy to work—can be formed, welded, soldered and riveted. It can be had in many forms—strip, sheets, tubes, welding rod, rivets, nuts and bolts.

Every fabricator should have a copy of Republic Catalog 217, containing detailed fabrication and installation data. Write for your copy.

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REPUBLIC STEEL CORPORATION

HERE'S HOW TO GET BUSINESS THIS SPRING

It's Not So Hard When You Are Properly Equipped

There is business to be had this spring if you go after it the right way. Not much new house work. But there is a bigger market awaiting you right now than the biggest building year ever offered, with competitive conditions largely out of the situation. That means better profits per job.

You can get your share of this business,—yes, more than your share,—if you work according to a plan, and have something to help you sell.

Right now is the time. You can begin by getting a lot of cleaning jobs and repair work, and laying the groundwork for future furnace sales.

We have outlined a simple plan which produces sure-fire results, and we equip Moncrief dealers with a series of helps that pave the way and carry part of the load of sales work.

Write at once for particulars. No use of going along the old hit-or-miss way. You will be gratified at the better results to be had by planning your work and letting Moncrief helps work for you.

THE HENRY FURNACE & FOUNDRY CO.

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The Moncrief dealer is most favorably situated to go after every kind of warm air heating and air conditioning job in his community. The Moncrief line includes all types and sizes of cast and steel furnaces of the highest type construction, and popularly priced. Moncrief Air Conditioning Systems are scientifically designed, well finished, and have proved to be exceptionally efficient and economical.

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AND

AIR CONDITIONING SYSTEMS

Covering All Activities
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Forced Warm Air Heating
Sheet Metal Contracting
Air Conditioning
Ventilating
Roofing

AMERICAN ARTISAN

With which is merged

FURNACES and SHEET METALS AND Warm-Air Heating

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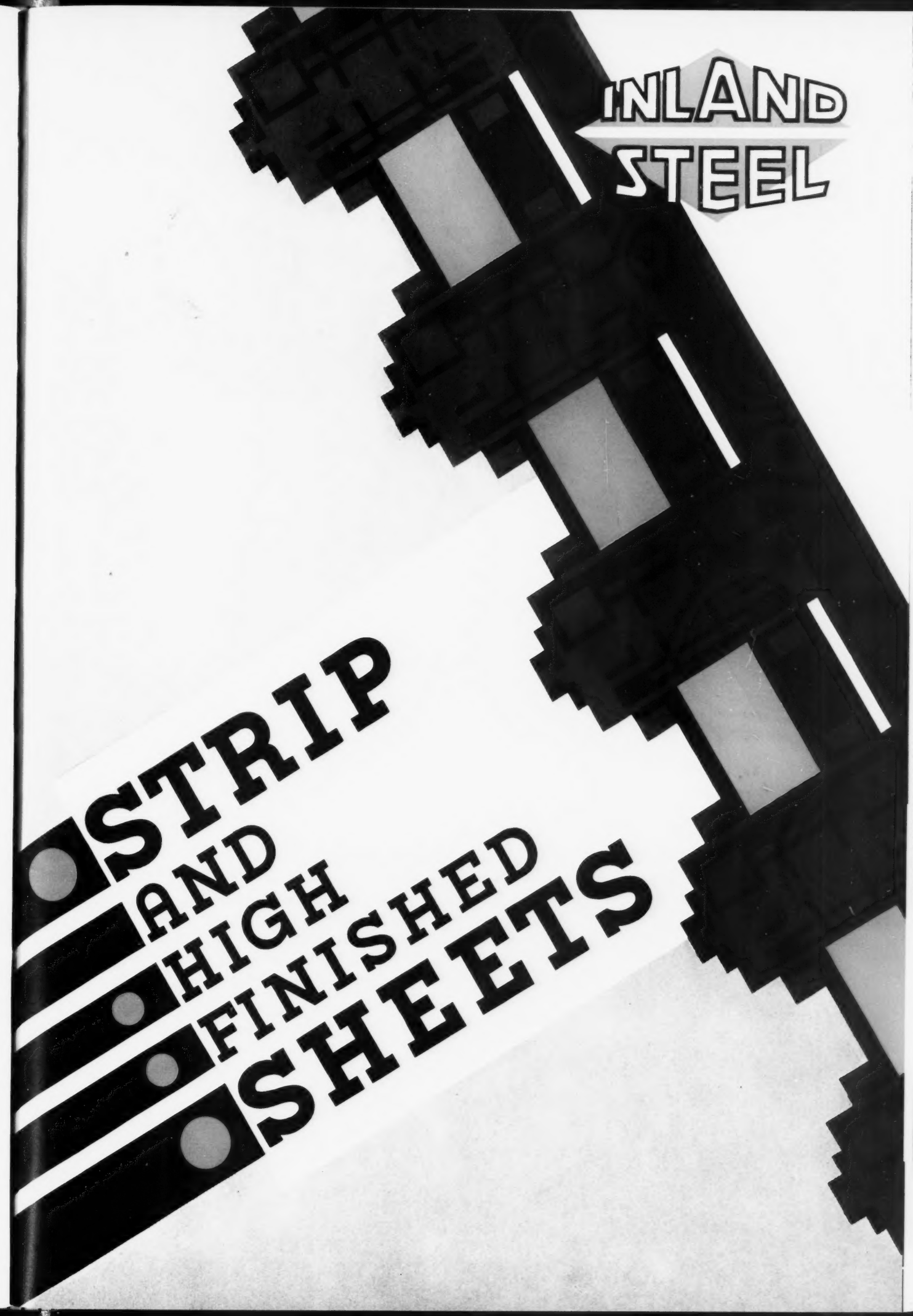
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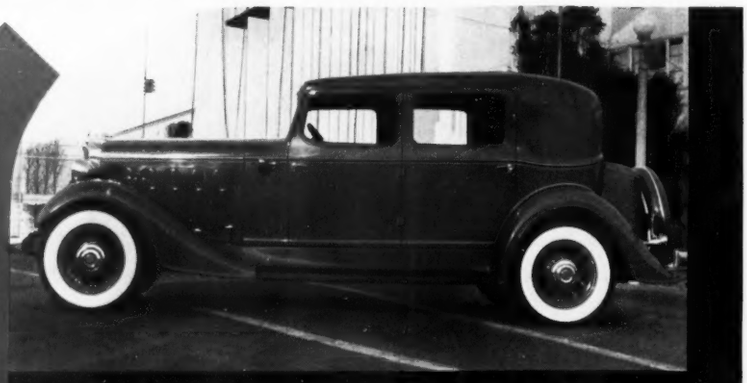

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Imitations give imitation results

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ONE of the queerest machines in the entire plant is the "porcupine" used in inspecting the sheets as they come from the galvanizing pot.

The illustration tells the story. Leaving the galvanizing bath, the sheets pass between the fingers on the "porcupine," (the long projecting iron rods) are lifted through an arc of 180 degrees, to be inspected on the other side.

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VOLUME 102 **AMERICAN ARTISAN** NUMBER 4

WARM AIR HEATING • SHEET METAL CONTRACTING • AIR CONDITIONING

April Is The Beginning—Not the End

WE RECEIVED a letter the other morning from a reader who asks: "Now that the heating season is over, what am I to do to keep my furnace business from dying on its feet during the summer?"

We don't like to get such letters. It makes us wonder how many more dealers there are who fold their hands over their stomach and get ready for an extended fishing season. It indicates that this reader, at least, has failed to grasp the potential sales possibilities of the services and products which can and are being sold every summer all over the country.

Without trying to dig too closely into correspondence of the past month we can list within the limitations of this page a number of plans which will be put into effect during April. In some cases these plans will be started in practically every sizeable community by thousands of contractors.

For instance, furnace cleaning. Most furnace men will clean. In many cases contractors have already canvassed home owners and have definite dates set for the cleaning job. In itself cleaning is a legitimate and profitable spring and summer service, but bad practices have crept in and the wise contractor is devising ways and means of getting around these practices in order to increase his cleaning volume and his cleaning profit.

We will have with us this spring the price cutter, the coal dealer offering free cleaning service with coal orders, the ex-mechanic willing to work for day wages and the out-and-out racketeer who cleans today and flies tomorrow.

So far as the coal dealer is concerned, we know of several contractors who have called on coal men and presented a plan whereby they clean and service the furnace in exchange for a little free will coal advertising. Most coal men started cleaning in order to hold customers who blamed the coal when the trouble was dirty furnaces. In most cases, cleaning is not profitable for the coal man and is willingly relinquished to a furnace dealer who is responsible, who does a good job and who will cooperate.

The price cutter, the ex-mechanic and the racketeer are a tougher problem. So far as we know the only satisfactory weapon is established reputation for doing good work, giving more service than the price cutter gives, and establishing a reputation for financial responsibility, honest workmanship, carefulness in the house, and willingness to make every job satisfactory. Such a reputation may take a long time to build up, but once established it holds the business.

A letter received a few days ago tells about a plan wherein a contractor proposes to sell automatic heating and forced air by talking about a remodeled and renovated basement. This contractor has already sold a number of such installations and taken the "general's" profit from the masonry, electrical and carpentry and painting contracts as well as the profit from his own equipment and labor.

Still another well known contractor is all set to sell thermostats on the appeal that spring and fall are times when it is difficult to maintain control over the fires and keep the fire from going out. This contractor not only sells thermostatic controls to those who do not have automatic devices, but sells limit controls to owners already having controls solely because the limit control will keep the fire from going out.

Some surprising letters have come in stating that some dealers feel the urge to de-bunk summer cooling and propose to sell cooling with a sales talk based upon actual facts and not upon strong arm claims for gadgets which cannot do one-tenth of the things claimed for them. Many of these contractors are using test results from Urbana and clippings of cooling articles to prove their statements of installation and operating costs. These men admit that their campaign will require sifting through a lot of names to get a few good prospects, but they feel sure every job will mean a substantial profit.

And, of course, there are a number who will sell residence ventilation—both mechanical and gravity. One contractor writes that he has made a canvass of several dozen homes nearby where he knows the owner has money and wants comfort and he has prepared individual plans showing how a gravity ventilation system will help make the owner comfortable this summer.

And then there is the filter. Now that we can install filters for gravity and mechanical systems every furnace owner becomes a prospect. If, as many contractors write, there is anything every housewife is willing to listen to it is a plan to eliminate dust and dirt and lessen the everday job of cleaning up the house. Filters do the trick. With mechanical systems the house can be cleaned by turning on the fan and in the spring when the fire is on during the night the gravity plant also operates as a cleaning system all night long.

These plans are taken at random. Certainly, they indicate that there is every reason for laying out a program for spring sales and no good reason for laying down on the job.

What are You Planning to do?

The church is a stone exterior with a vaulted auditorium without any balcony. The social room below is practically above ground level

Heating A Church By The Floor Plenum System

"ST. JOHN'S EPISCOPAL CHURCH at Sandy Hook, Conn., is heated with a warm air recirculating system, using a blower for positive air circulation, with the blower controlled by a thermostatic switch. Air from the furnace is circulated through the iron bar joists of the floor framing and from this plenum is distributed through vertical ducts under windows and admitted into the room at the window stools about 4 feet above the floor. The air is then returned to the blower along the floor.

"The iron bar joists are covered with 3 inches of concrete placed as a floor. There is a plaster ceiling below to form the lower surface of the plenum. The ceiling and the lower surface of the concrete floor are covered on the inner surface with a paper covered lath and smooth plaster.

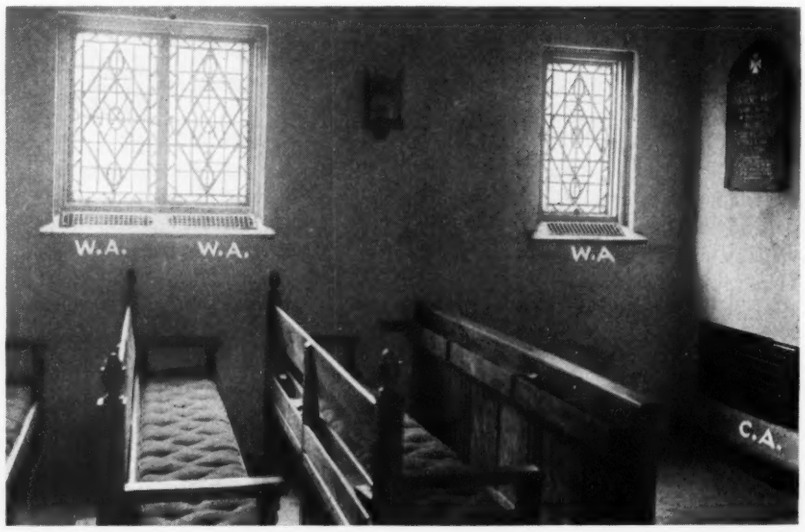
"The advantage of this system is that the floors are warmed by conduction through the floor slab thereby eliminating cold floors and floor drafts. This plenum distribution noticeably reduced the amount of duct work necessary and made lower construction costs possible."

✦ ✦ ✦

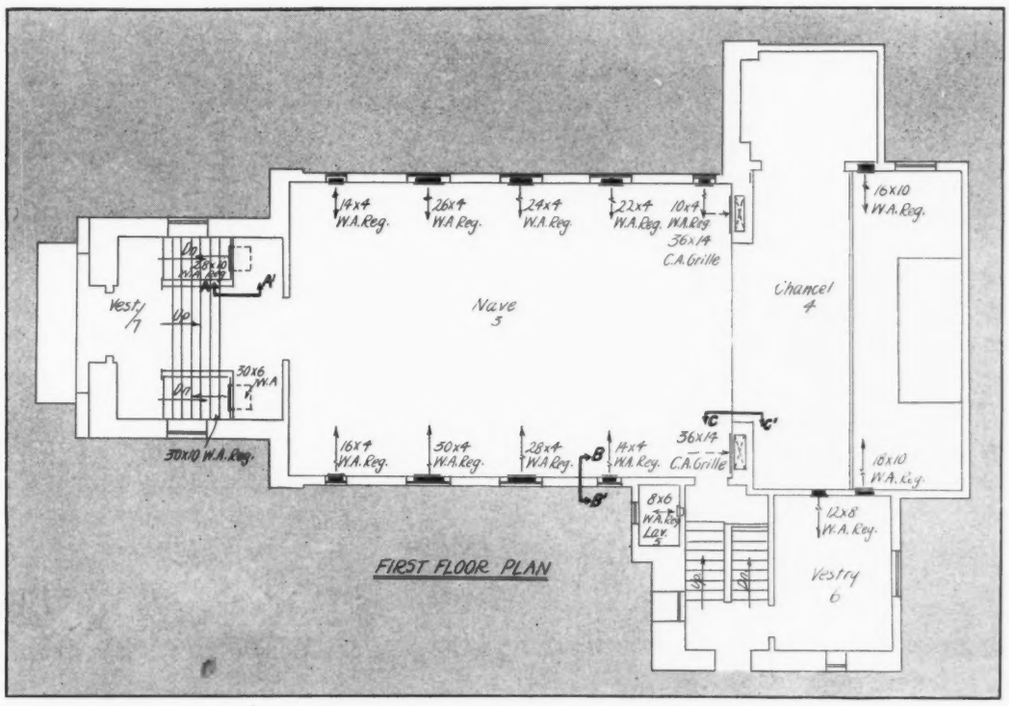
The above quotations, from the architectural firm of Beckwith & Wilkins of Bridgeport, Conn., architects for the church, was sent to the Bridgeport Furnace Works, Bridgeport, Conn., after this church installation had been completed and demonstrated satisfactory operation.

This system, as shown on the plans and in the details and photographs, is replete with interesting features. Through the cooperation of the Bridgeport Furnace Works we are able to show in drawings all of the important features in such detail that little explanation is necessary. These drawings, with the data sheet, also furnish a complete picture of the design and operation.

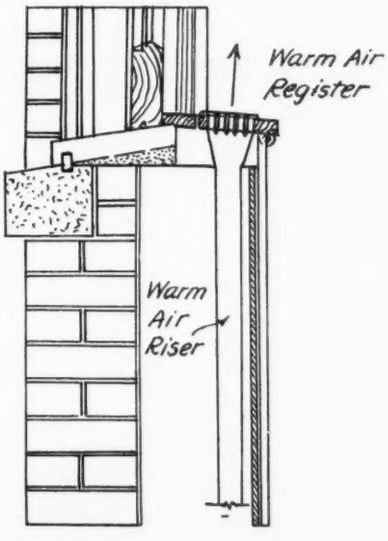
Some interesting comments on the design, sales and installation are cited by Louis J. Vichioli, president



Warm air is introduced to the auditorium through registers in the window sills. All air from the auditorium is returned through a pair of grilles like the one shown at the right side of the photo



The real problems of this church was the elimination of cold floors, prevention of floor drafts and breaking up of stratification due to the high ceiling. The detail below and to the left shows the supply system to window sills



DETAIL B-B'

of the Bridgeport Furnace Works, who says:

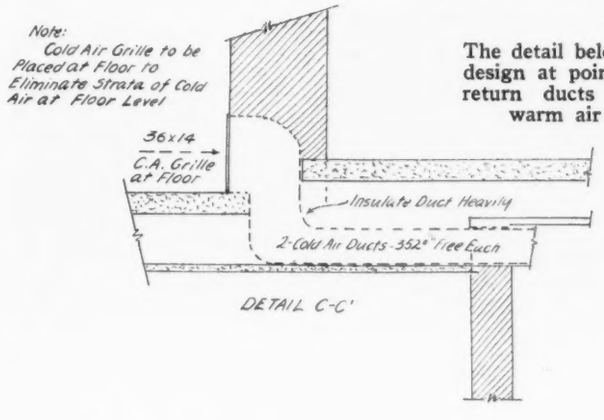
"We have been in the warm air furnace business for fifteen years and have had some twenty-one years of experience in furnace work. We specialize in manufacturing, installing and designing warm air heating systems, all installed according to the Standard Code or the best practice in forced air work. We find this new field of forced air work both interesting and profitable.

"We are very proud of this particular system because it received so many compliments from members of the church and the architects who are now enthusiastic over this method of heating a church. In design the system follows sound practice, but perhaps not practices which have proved widely acceptable.

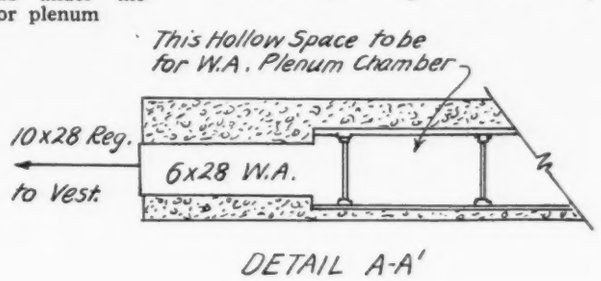
"There is no good reason why

The photo above shows the supply to the vestry stair well and the detail below the duct construction at the same point

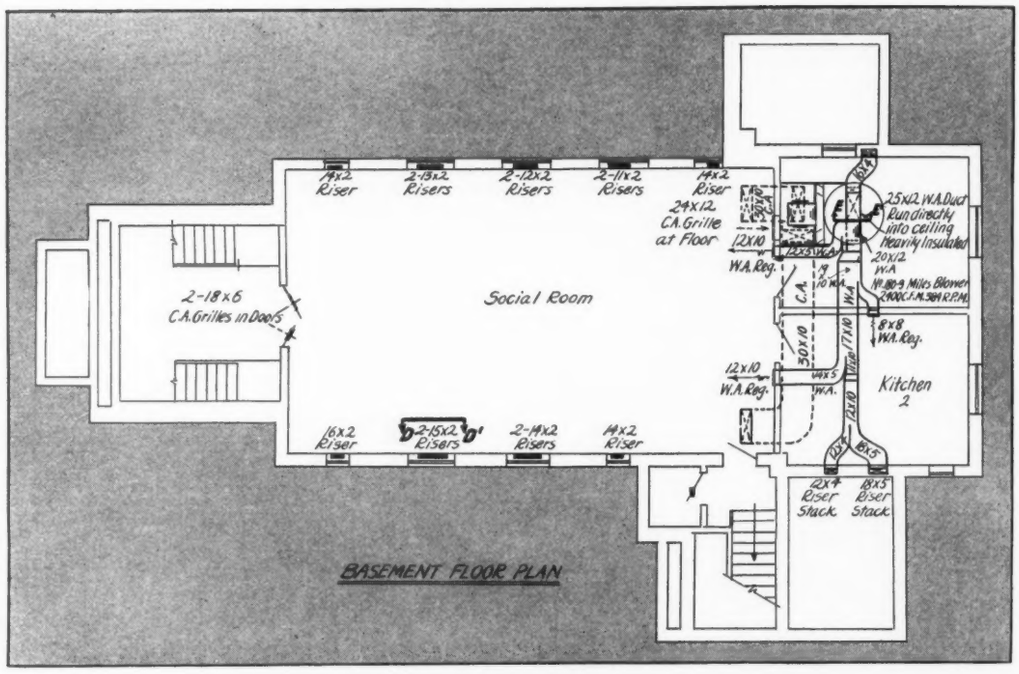
The detail below and left shows design at point C-C' where the return ducts pass under the warm air floor plenum



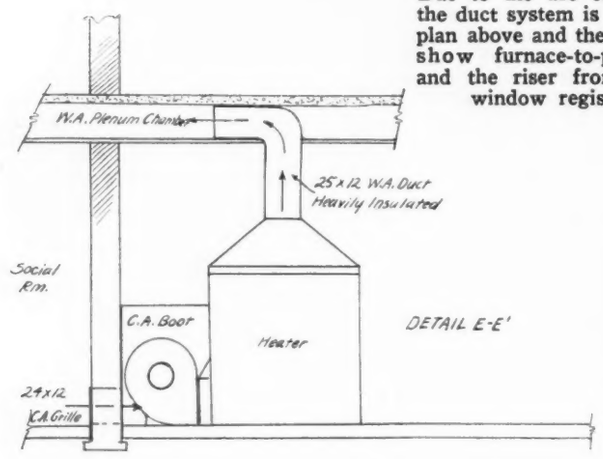
DETAIL C-C'

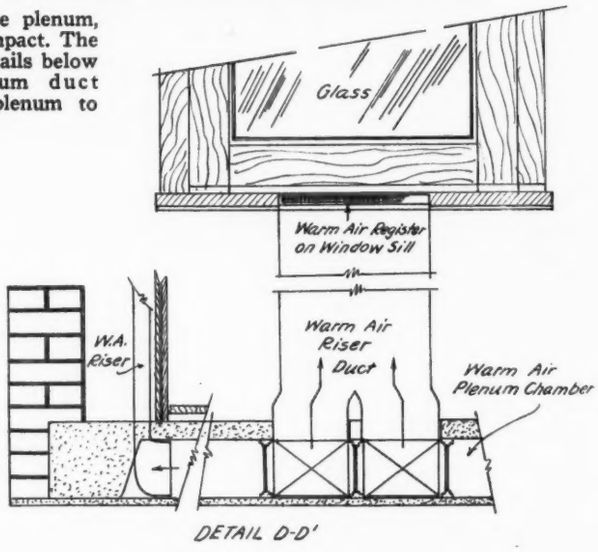


DETAIL A-A'



Due to the use of the plenum, the duct system is compact. The plan above and the details below show furnace-to-plenum duct and the riser from plenum to window register

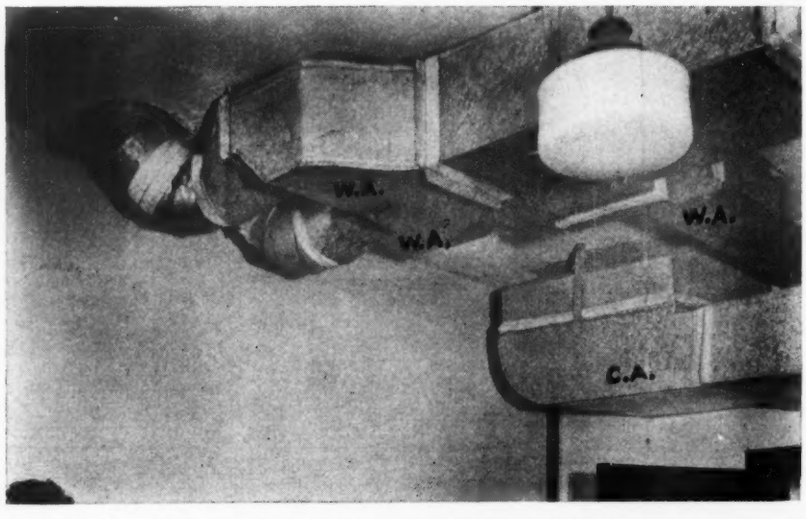




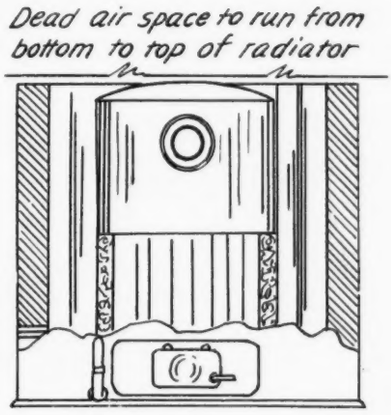
such underfloor systems should not work. When properly designed the space between floor and ceiling forms a plenum which maintains the floor temperature and provides an excellent distribution system for the air from the furnace.

"Generally we find the main difficulty comes in selling the architect on the idea of using the floor as a plenum. Also, many architects and contractors will not cooperate with the furnace man to the extent re-required by these systems because it is absolutely necessary that the plenum space be smooth and free of all obstructions.

"This particular system employs a Sunbeam steel furnace having a grate area of 5.08 square feet and rated for 1,100 square inches of



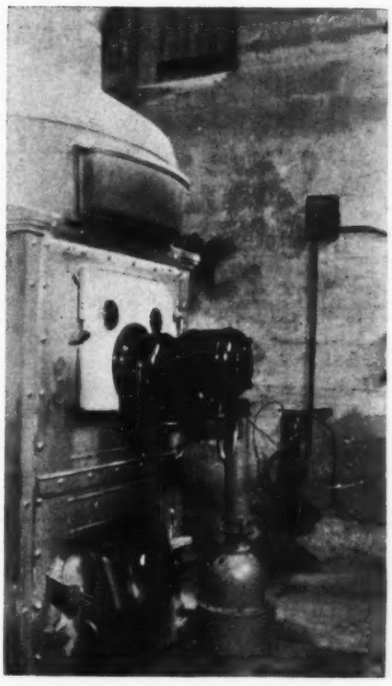
These ducts appear on the plan above at the end of the longest supply main. Standing seam stiffeners and wrapped joints are used



leader pipe. Propulsion is by a Miles blower number 180-9 delivering 2,400 C.F.M. against ¼-inch static pressure at 384 R.P.M. Heat is supplied by an oil burner installed on the fire door. The burner can be taken out at a minute's notice and a coal fire started. If the burner is again desired it can be swung into the fire door and started without change.

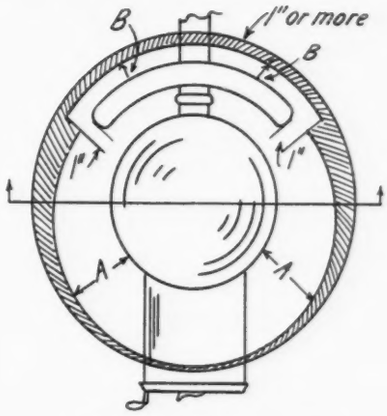
"In operation the control system is as follows: The room thermostat calls for heat and the oil burner goes on. When the bonnet temperature builds up to 200 degrees the fan starts and continues as long as the bonnet temperature is above 200 and the room thermostat is not satisfied. With a coal fire, the bonnet temperature is set down to 165 degrees because while the burner can be controlled with a limit control, with coal this temperature would make it difficult to keep from over-riding the room thermostat because of the residue heat in the casing.

"On this particular furnace the air space was baffled as shown in one of the drawings. Each side of the casing in front of the radiator was blocked off as shown to give an equal distance between drum and liner from radiator ends to fire door. The space behind the radiator was also insulated by blocking as shown. The resulting space was calculated to give a free area equal to 2.084 times the grate area.



The oil burning furnace is baffled as shown in the two details above. The burner may be withdrawn and coal used

"All the installation and fabrication was done by our firm in our shop. We established relations with both architect and builder which helped us greatly, because without their cooperation any number of small things might have gone wrong. The builder made the necessary openings in the concrete floor and the architect saw to it that our specifications were met in every detail and that no rubbish was left in the plenum space."



Baffle for Furnace

In addition to these points emphasized by Mr. Vichioli, there are some features of the design worth mention. The social room in the basement is supplied by two large grilles located in the end wall right up against the ceiling. Return air is passed through grilles in the doors at the rear of the social room and pulled back from the stair well which also serves the auditorium.

The auditorium plenum space is supplied by the large duct which rises straight up from the bonnet and enters the plenum space directly above the heater. The warmed air circulates throughout this space and rises along the outside walls through the risers shown on one of the details through short stacks which empty into the auditorium through the registers located in the window stools.

Return air from the auditorium is pulled through the two large grilles located at each side of the chancel. These appear on one of the photographs. One of the details also shows how this return air duct is insulated from the plenum chamber under which it passes for a short distance.

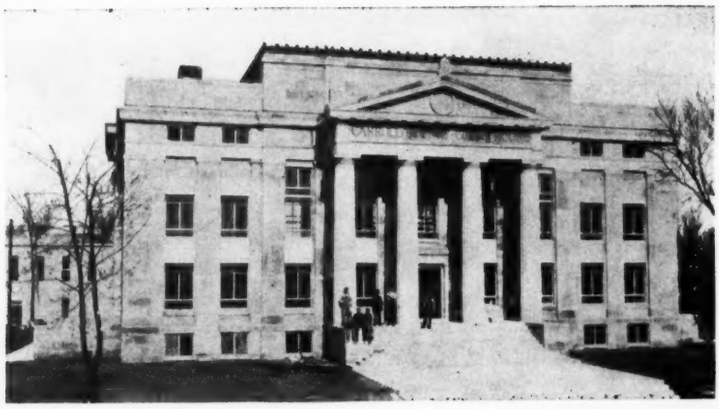
Room	Dimension	Cub. Cont.	C.F.M.	Dsnt. W.A. 400 Vel.	Glass 1.1	Wall .25	Ceiling Floor .25	Infil. .02	Temp. Diff.	B.T.U. loss	B.T.U. for vent	Grate area	Reg. Temp.
Social	41x24x9	8856	364	129	129	375		8856	70°	28910		3.06#	
Kitchen	13x16x9	1872	78	28	21	124		1872	"	6370			
Nave	38x25x16	15200	989	357	129	607	1368	15200	"	65800		8" coal	
Chancel	24x27x15	9720	468	169	71	567	720	9720	"	36680			
Lav.	4x5x8	160	31	11	6	66	20	160	"	2240			
Vestry	10x13x8	1040	117	42	25	175	130	1040	"	8820			
		36848	2047	736						148820	=Btu - Heat Loss		
										1488	= 10% Safety		
										163,702			
Vestibule	32x11x9	3168	354	127	78	328	210	3168	"	19880	=Vest. Heat Loss		
		40016	2401	863						1988			
										185,570			

$$C.F.M = \frac{Btu \times 55}{T.R. \times 60} \quad (75°)$$

$$G.A = \frac{185570}{8 \times 12000 \times .7 \times .9} = 3.06\#$$

Above is the data sheet for the job. The heat loss factors used are quite customary. The only unusual factor may the 70 degree temperature rise for the high-ceilinged auditorium, usually figured higher

Copper Cresting and Protection Carroll County, Ky., Court House



THE Carroll County court house at Huntington, Tennessee, completed early last spring, is ornamented with a copper cresting and protected with copper flashings designed to afford complete protection for the rather heavy masonry cornices around the buildings and above the entranceways.

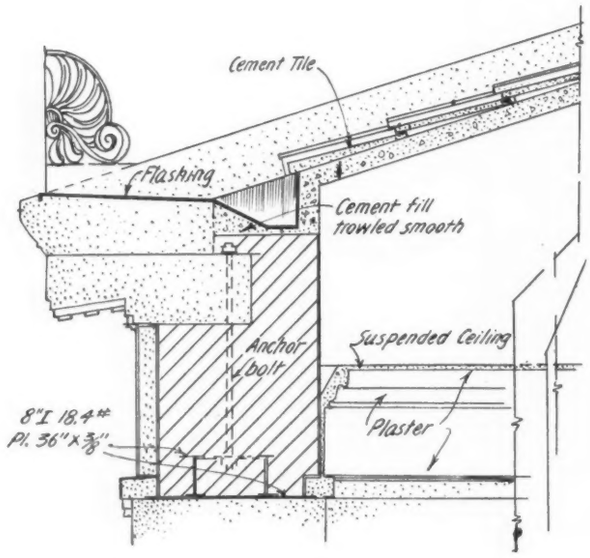
The architects, Hart, Freeland & Roberts, specified flashing construction which would be permanent and afford real protection against moisture penetration into masonry joints. The sheet metal contractor, the H. E. Parmer Company of Nashville, worked out satisfactory designs which were adopted.

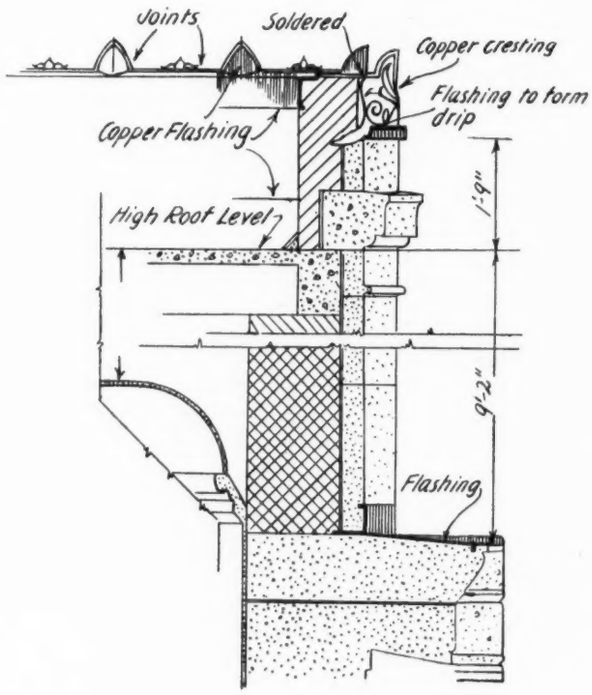
The Flashing

In general plan the building has two full floors and an attic above the English basement. At the attic ceiling level there is a heavy masonry cornice having about 18 inches of projection over the curtain wall. Above the cornice the masonry rises sheer for four and one-half feet. In order to prevent any destruction from moisture the joint between the cornice and the parapet above is protected by a single flashing sheet standing 6 inches above the cornice and extending out 16 inches along the top of the cornice.

This flashing sheet was formed with a loose fold along the top and bottom edge. This fold was turned at right angles to permit the fold being sunk in reglets as shown on one of the details. The reglet is caulked with compound. In erec-

The two details below show fabrication and application of the copper cresting, gutters and flashings used as masonry protection. The architect's aim was complete weather protection for the masonry





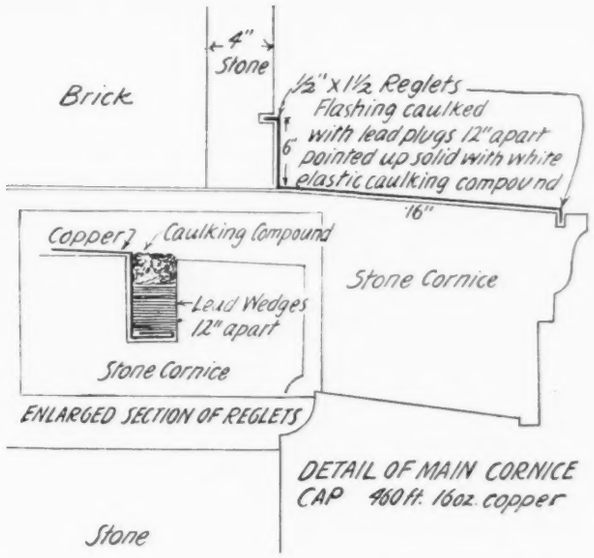
tion, lead plugs were driven into the reglet at 12-inch intervals.

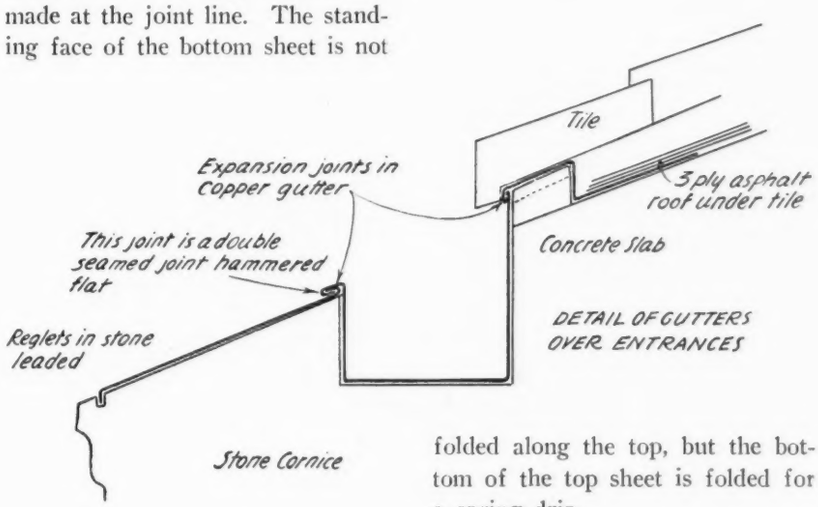
The back side of this parapet is 1 foot and 11 inches high with a built up roof above the attic. The parapet-roof joint is protected with a two-piece flashing. The top section is carried down 3 inches over the bottom sheet. The top sheet is turned into the joint between the stone and brick work for the depth of the stone facing—4 inches. The inside edge is turned up behind the stone.

The bottom sheet begins at this joint, about 6 inches above the finished roof line and is carried under the built up roof for about 3½ inches. Two 45-degree bends are made at the joint line. The standing face of the bottom sheet is not folded along the top, but the bottom of the top sheet is folded for a spring drip.

More than 1,400 feet of flashing were required for the building.

All masonry cornices are protected by copper flashings which follow the stone surface. Upper edges and outer edges are sunk and caulked in reglets. The method of forming the edge is shown in the enlarged detail





Above is shown the construction of the copper lined gutter sunk in the pediments. Two folded seams were used to provide a one-piece gutter. The edges are caulked in reglets

The Gutters

Both north and south elevations of the building have ornate entrances as shown in the photograph of the building. These entrances have angular pediments roofed with cement tile and drained by end gutters sunk in the masonry.

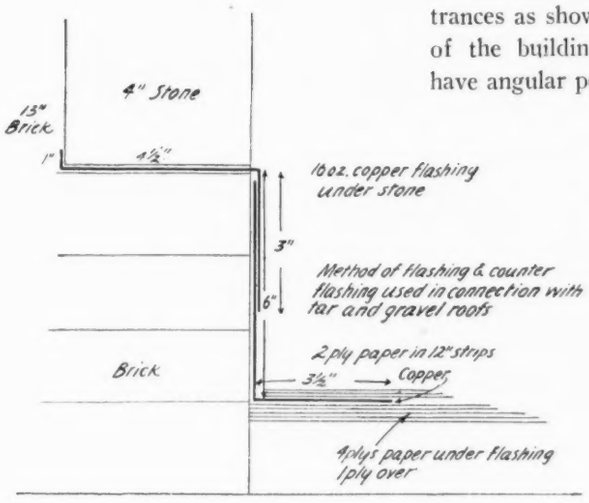
In application, the gutter was formed from a single sheet which provides a back, bottom and front. A flashing sheet is brought out from under the tile and double locked with the top edge of the gutter sheet under an overhanging edge of the tile.

The outside edge is provided for double locking with a cornice cap sheet which covers all the cornice and is caulked into a reglet in the stone. This joint was hammered flat in construction.

The flashing sheet under the tile is laid next to the concrete slab and covered with a three-ply built up roof which lies under all the tile.

Construction of this gutter is shown in one of the details.

Expansion joints are provided along the gutter at the high points. The design of the expansion joint is shown to consist of 2½ inch cap slipped over the turned standing edges of adjoining sheets. This cap is not turned down, but left flat to provide slip in the sheets under expansion.

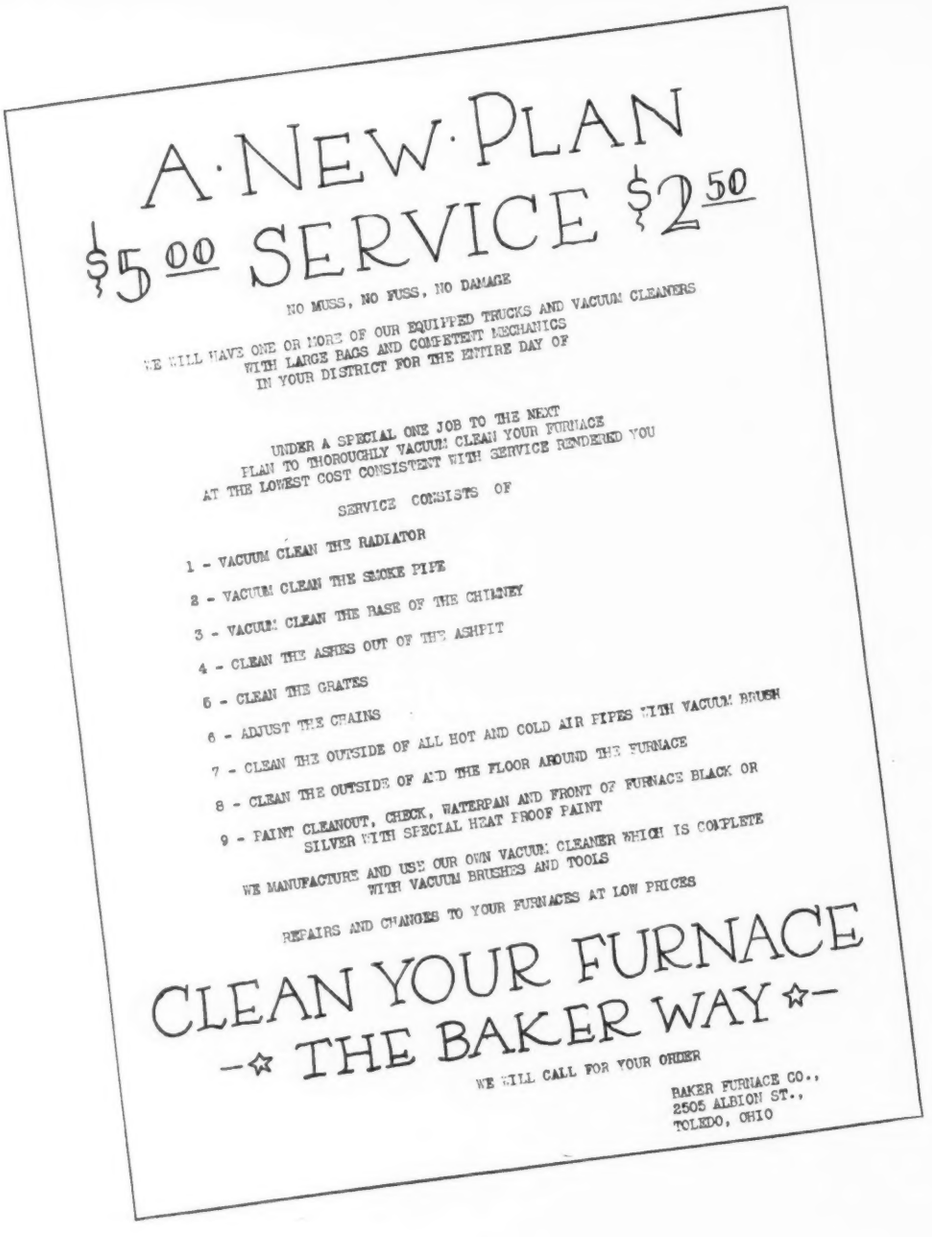


Copper flashings are used behind the parapet walls where built up roofing is applied. This flashing is two-piece of simple fabrication

The Cresting

Above the attic floor and occupying about two-thirds of the building width from front to back, is a high roof level which accommodates a suspended ceiling in the attic.

(Continued on page 26)



A·NEW·PLAN
$5.00 SERVICE $2.50

NO MUSS, NO FUSS, NO DAMAGE

WE WILL HAVE ONE OR MORE OF OUR EQUIPPED TRUCKS AND VACUUM CLEANERS WITH LARGE BAGS AND COMPETENT MECHANICS IN YOUR DISTRICT FOR THE ENTIRE DAY OF

UNDER A SPECIAL ONE JOB TO THE NEXT PLAN TO THOROUGHLY VACUUM CLEAN YOUR FURNACE AT THE LOWEST COST CONSISTENT WITH SERVICE RENDERED YOU

SERVICE CONSISTS OF

1 - VACUUM CLEAN THE RADIATOR
2 - VACUUM CLEAN THE SMOKE PIPE
3 - VACUUM CLEAN THE BASE OF THE CHIMNEY
4 - CLEAN THE ASHES OUT OF THE ASHPIT
5 - CLEAN THE GRATES
6 - ADJUST THE CHAINS
7 - CLEAN THE OUTSIDE OF ALL HOT AND COLD AIR PIPES WITH VACUUM BRUSH
8 - CLEAN THE OUTSIDE OF AND THE FLOOR AROUND THE FURNACE
9 - PAINT CLEANOUT, CHECK, WATERPAN AND FRONT OF FURNACE BLACK OR SILVER WITH SPECIAL HEAT PROOF PAINT

WE MANUFACTURE AND USE OUR OWN VACUUM CLEANER WHICH IS COMPLETE WITH VACUUM BRUSHES AND TOOLS

REPAIRS AND CHANGES TO YOUR FURNACES AT LOW PRICES

CLEAN YOUR FURNACE
—☆ THE BAKER WAY ☆—

WE WILL CALL FOR YOUR ORDER

BAKER FURNACE CO.,
2505 ALBION ST.,
TOLEDO, OHIO

The mail box stuffer shown here measured 8½ by 11 inches and has black lettering on green paper. The text was mimeographed to keep costs down. Putting in mail boxes proved cheaper than mailing. The appeal is the nine services offered for $2.50

This Direct Mail Campaign Brought 200 Furance Cleaning Jobs a Month

SOLICITATING furnace cleaning by means of direct mail literature is one form of advertising most furnace dealers have tried at one time or another. The form of mailing piece used has varied greatly, as have the results obtained.

With competition in cleaning increasing, greater care with the preparation of the mailing literature and with the distribution have become necessary. Contractors have found that simply mailing out a number of cards or leaflets is not the profitable road to success.

In Toledo, Ohio, the Baker Furnace Company conducted a cleaning campaign last summer and fall using an interesting type of leaflet and getting profitable returns. The appearance of the leaflet used—which is really a mailing card—is shown by the illustrations which show both sides of the card and the stuffer sheet which accompanied the card.

The company solicited business from all homes in Toledo. Names were secured from the company's files of customers and prospects compiled from several years' of operation in heating solicitation. These names were augmented by ad-

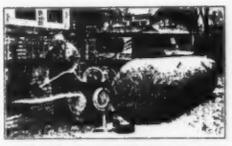
ditional names secured from directories and lists of owners circularized in previous campaigns.

The card and stuffer were not mailed, but were placed in mail boxes by a distributing agency. This form of distribution was preferred to mailing to save cost and also to avoid delivering cards to addresses where no business could be secured.

Distribution began in May and was continued during the summer and fall. Instead of sending out cards to the entire list at one time, the cards were delivered by districts and in batches small enough to permit follow up without too much intervening delay.

To the right is the inside of the 9½ by 11 inch mailing piece used. Note the number of services listed and the return coupon to make reply easy. The company reports that several of the services brought filled in coupons

SAVE
—By Cleaning Your Heating Plant NOW!
PRICES REDUCED ONE-THIRD



No Fuss! No Muss! No Damage!

Your Furnace Cleaned
By Our Own Special Vacuum Process
Inside and Out, for $5.00
Fire travel, base chimney Tops, H. A. and C. A. Pipes, paint front and adjust chains for..... **$2.50**
Fire Travel only..... **$1.50**
Satisfaction Guaranteed
Prices will advance toward Heating Season.
Mail the card today

BECAUSE
• •BAKER'S
• • PRICES
Are LOWEST

SOOT and its chemical action with summer dampness rusts smoke pipe and furnace more than use. A sooty furnace and chimney causes fires, spoils wall paper, decorations, and causes a lot of floor, wall and window cleaning. One-eighth inch of soot reduces furnace efficiency 25%.
ARE an old established firm since 1914. We guarantee our service to be satisfactory. We design and manufacture our own cleaning equipment and for sale to others.
Quoted above are the lowest we have ever made, and have been reduced one-third to one-half. We do the same amount of work previously done at the higher price.
REPAIRS for most makes of furnaces carried in stock. Factory to you prices apply on repairs. Smoke pipe is carried with cleaner wagon, these repairs easily and quickly made.

WASH AND CLEAN
the air in your home with a
Baker Air Conditioner

$239.50
This conditioner removes the large amount of dust and fumes in the air and adds the right amount of humidity for healthful heat. It cools in summer, prevents colds in winter.
Curtains, rugs, furniture and decorations remain spick and span for long periods in homes air conditioned this modern way.
Mail the card

Eave Troughing

NOW is the time to repair, patch or replace that leaky eave troughing and spouting.
WE have men specially trained for this kind of work.
Lowest Prices Prevail
Mail the card and our estimator will call.
No postage required.

DUSTOP FILTERS

These filters can be installed on any furnace. They remove 98% of dust and dirt.

Sheet-Metal Work
We specialize in the following items, some of which you may need.
A new hot or cold air to any room
Thermostats and Controls
Furnace Gas Burners
We are experts on chimney troubles.
New Roofing or Patching
Steel Ceilings, Ice Box Drains
Special Pans, Pails, Boxes. Any light or heavy Sheet-Metal Work.

MONCRIEF FURNACES
Direct from Factory to You
THINK OF IT
First Quality All Cast Moncrief Furnace at mail order prices.

MAKE X IN THE ☐ YOU WISH TO HAVE DONE OR ESTIMATED
Estimates Free Without Obligation To Buy
THIS CARD IF MAILED IN U. S. ENTITLES YOU TO ONE ... AND ONE FREE. VALUE 75¢
☐ Clean my furnace ..... Date ..... Price of Job Wanted
☐ I wish an estimate on furnace repairs
☐ I wish an estimate on eaves troughing
☐ I wish an estimate on Sheet-Metal work
☐ I am interested in air filters
☐ I wish to purchase a new furnace, please have your heating engineer call
☐ I wish more information on air conditioning equipment
Name .....
Address ..... Phone .....

To the left is the outside of the folder. The printing is black on yellow paper. The piece is folded three times and can be mailed or delivered

Results compiled August 15 showed that an average of 200 cleaning jobs a month had been obtained. In addition, approximately 35 per cent of the cleaning jobs brought additional work in the form of repairs, replacements and alteration work.

This last result is important because at the $2.50 price the margin of profit was small and repair work at greater margins and in larger amounts helped greatly to raise the total profit resulting from the campaign.

Attention is called to the stuffer which names the cost of the cleaning service and itemizes the nine distinct operations included for $2.50. These operations are designed to

(*Continued on page* 23)

TOLEDO, OHIO

To

Or I'll fix you!

U. S. POSTAGE
PAID
TOLEDO, OHIO
PERMIT No. 746

BAKER FURNACE CO.
2505 ALBION ST., TOLEDO, OHIO
MANUFACTURERS ·:· INSTALLERS
Gravity, Forced-air and Air Conditioned Heating Systems

SPECIFY → BAKER SQUARE DESIGN BOILER PLATE FURNACES
GUARANTEED 10 YEARS
FOR LONGER LIFE LEAK PROOF CONSTRUCTION

"TOLEDO'S LEADING FURNACE INSTALLERS"

First Class Permit No. 135 Sec. 34½ P. L. R. TOLEDO, OHIO

BUSINESS REPLY CARD
NO POSTAGE STAMP NECESSARY IF MAILED IN UNITED STATES
2c POSTAGE WILL BE PAID BY—
BAKER FURNACE CO.
2505 Albion Street,
TOLEDO, OHIO

IF you wish to buy the best furnace there is, from the standpoint of long life, economy and leak-proof service free from repairs and dirt then buy a BAKER WELDED SQUARE DESIGN BOILER PLATE FURNACE

EXCLUSIVE FEATURES

Welded In One Piece — Cannot Leak
Self Regulating — Faster Circulation
Ash Pan, No Dust
Special Hot Blast
Leak-Proof Casing
Heats Rooms Harder — To Heat

ASK FOR PARTICULARS

Many of Washington's finest structures have been roofed, flashed and waterproofed by the Rose Bros. Co., contractors of forty years standing. This promenade was finished in walking tile, flashed and waterproofed by the company. Below is a typical newspaper advertisement. Note how reputation is played up.

"Reputation Is the Most Important Thing in the Roofing Business"—Rose Bros.

By F. E. Kunkel

THE firm of Rose Brothers Company, Inc., of Rosslyn, Va., (founded in 1891 by W. R. Rose), deals exclusively in roofing materials and sheet metal flashing for roofs. Their principal business is roofing and waterproofing with an additional 20 per cent resurfacing; and 20 per cent repairing of slag roofing. "Builders of Better Roofing For Over 40 Years" is their slogan.

The company has roofed many prominent hotels in the Nation's Capitol, such as the New Shoreham Hotel and Wardman Park, and many public and government buildings of note. It has waterproofed the Lincoln Memorial Reflecting Pool, of eight acres.

Mr. Rose is strong on metal flashings for composition roofing and he claims that roof tops as a whole in Washington look workmanlike because they are using metal flashings and only good quality roofing materials. "We are not only roofing new buildings, but old buildings with substantial materials," he says, "and the trend is decidedly toward better roofing."

Rose Brothers Company has put on as high as 680 roofs in one year. Its new plant in Rosslyn, Va., across the Potomac River from Washington, occupies a space of 30,000 square feet, in lot and two story building, 10,000 feet being under cover.

Mr. Rose keeps a unique book record of all jobs done, arranged alphabetically, allowing so many pages in the book to each letter of the alphabet. "This is a handy bound reference book" he says. "When they come back again for re-roofing, we usually have a reference right there, or we can quickly find out when they need new roofing. This book shows the date the job was done, name, address of owner, whether a home, garage, church, apartment, hotel, hospital, etc., the number of square feet, and the selling price."

Asked as to what Mr. Rose attributed his success in business, he replied, "We try to keep at least a half step, if not a couple of jumps, ahead of the other fellow

in service and quality products. And then your price being right, you are all right. Of course, there is such a thing as courtesy, service and reputation.

"Building up a reliable reputation is probably the most important thing in the roofing business because the man who builds and the man who buys are both beneficiaries of a good reputation. To the contractor it is a continuous spur and incentive, to the buyer the strongest of all guarantees that what he buys is worthy. Reputation is really the beginning and not the end of endeavor. It is a reminder that the standards which won recognition can never again be lowered. Reputation is never completely earned—it is always being earned—it is a continuing responsibility—once you have been accorded a reputation, you cannot drop below your best. Once you do good work you must continue and go on doing good work. The man who builds well must go on building well.

"There are those who look upon the successful roofer who has achieved a place of influence and distinction as though he had in some way gained a citadel in which he could stand secure against every attack. The truth is all he has done is to gain another level of responsibility in which he must make good.

"We continually keep before us the policy that every customer must be treated as if we needed the business badly, and not as if we had more than we can handle. We don't stop, but study out new ways and means of giving better service to the customer than is now being offered. We try to get more real satisfaction out of serving a customer than we do in selling our roofing or service. We make the customer's interests our interests. We try to think constructively about our business.

"We don't talk about the end of a period like a month or a year that has just passed, as the best or poorest, but we feel we are always beginning a new period which calls for still further effort, and that nowadays you have got to keep on top or you soon find yourself at the bottom, with the rapid changes that are taking place in the business world. You simply cannot rest content. You may have been vigilant—it remains to be yet more vigilant. You may have been faithful, but fidelity is an active virtue which demands its daily sacrifice or any counter interest, its daily response is energetic service."

Another newspaper ad, again using reputation and responsibility as the keynote.

Furnace Cleaning Campaign (*Continued from page* 21)

make the furnace operate more satisfactorily and to generally clean and brighten up the furnace and the basement.

"The card used," states the company, "was deliberately planned to sell cleaning and to also call attention to other work and repairs which the company can do.

"For example," they say, "we have tried to work up some leads on our air conditioning unit by giving this item some display space on the folder. We have done the same thing with drainage work and general sheet metal work needed around the average residence. These services helped build repeat business.

"These additional services are not intended to detract from the principle service—furnace cleaning—offered, but so few home owners ever think of their eaves trough and downspouts, of steel ceilings, pans or what not, until the work is absolutely necessary, that we thought it well worth while to try and bring in some inquiries for this type of service."

The mailing piece has a return card section on which is listed the items arranged for checking. A rubber stamp placed above the list states—"This card if mailed in before .....entitles you to one thermometer free, value 75c." The date was filled in to give about seven days. The idea was to get cards back promptly."

OPEN for DISCUSSION

Readers are invited to contribute their experiences or suggestions to the topics under discussion or to submit problems on which they wish discussion. Sketches showing your ideas are desired.

Selecting the Thermostat Location [Part II]

SEVERAL issues ago we published a problem on thermostate location and published reader's suggestions. We pointed out how impossible it is to control temperatures in some types of houses with one thermostat.

In order to make this discussion as complete as possible we selected an average, two-story house, reasonably compact, with typical wall spaces and sent floor plans to a number of readers in all parts of the country. We asked readers to show on these plans just where they would place their thermostat and to indicate whether they considered more than one control necessary.

The master floor plan shows the locations selected by nine readers. The answers sent in by six of the nine were published in the December issue. We now publish the remaining suggestions.

Why they selected these locations and what factors guided them in their choice follows:

Frank Anderson, Terra Haute, Ind.

Frank Anderson, who operates in Terra Haute, Indiana, and who has been one of the pioneers in forced air heating in his home state presents some very interesting information to back up his choice of positions 6A, 6B and 6C. He says—

"Automatic control is to be recommended for the small home as well as the large public building, and its specification we believe should be based on house construction, heating installation, owner's requirements, and fuel fired.

"In the home under consideration, we note: Average building construction; first floor, open; second floor bedroom over garage requires more heat than any other room; the heating installation to be manual, coal-fired forced air; owner desires uniform temperature day and night in living room, dining room and master's room No. 102.

"Then our desire would prompt us to specify:

1—One electric clock double throw thermostat in dining room.

2—One volume damper thermostat in living room.

3—One volume limit damper thermostat in bedroom No. 102.

4—One control to control maximum heater temperature.

5—One mercury switch to control blower.

"The dining room is chosen for the master thermostat to operate drafts, in preference to living room as intermittent use of fireplace will prevent satisfactory control.

"The hall is second to dining room since draft from the frequently opened hall door causes unnecessary action of equipment, resulting in fuel waste and over heating.

"The thermostat location we favor is a central room requiring heat day and night—an an inside wall *always* where register, stack, flue, sunbeams, draught or vibration will not affect the thermostat.

"The damper thermostat in the living room reduces volume as fireplace is in use and oftentimes benefits hard to heat rooms while plant is operating on gravity.

"The damper thermostat in bedroom No. 102 controls temperature as various registers are closed, permitting uniform temperature after other rooms are cooling down to night time temperature.

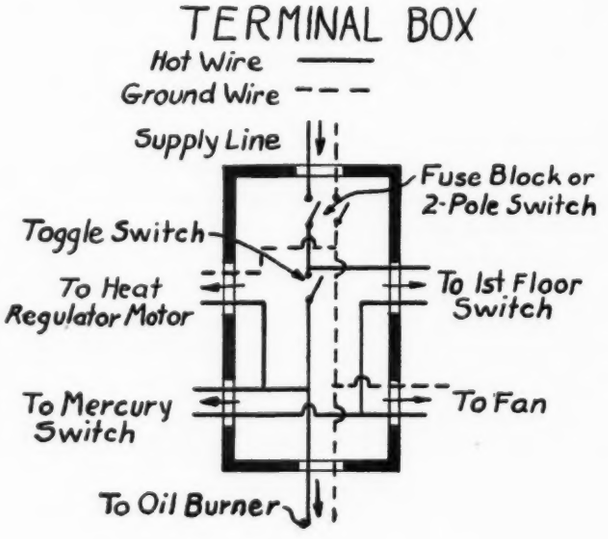
"It is quite evident, we are not in sympathy with those who advise coldest room or cold wall locations.

"As illustration, presume the thermostat is installed in bedroom No. 104 —during periods of gravity circulation, this room would chill, opening the drafts, starting blower—result over-

▲

The diagram shows the electrical hookup recommended by Frank Anderson. An electrician is not needed to wire and hookup this arrangement

▼



heating other rooms (wasting fuel), particularly the living room during time fire place is fired. Again, air-conditioning is not so completely sold as to prevent the occupants of this bedroom from opening the windows in their endeavor to secure so-called "pure air," thereby keeping the system active through entire night.

"There is to our knowledge no case of uniform inside temperature, where the basis of control is outside temperature, therefore, we can not conceive a desired temperature maintained where a sensitive control is placed on an outside wall subject to frequent temperature changes.

"For temperature settings (this installation) we would recommend—

1—Clock thermostat in dining room 65 degrees night; 70 degrees day.

2—Damper thermostats, 70 degrees or owner's desire.

3—Limit control, 180 to 200 degrees.

4—Mercury switch, 130 to 150 degrees, wired so blower stops as draft closes.

"To simplify the wiring and save costs of licensed electrician, we recommend a terminal box where final connections are completed by an experienced regulator installer. (See diagram enclosed.)

"Permit me to add—a local home similar to this home, was equipped with forced air heating system with one thermostat installed in living room (as marked 6X on plans). This thermo controls two fans which force circulation through rectangle ducts to all rooms, with gravity circulation cut out as fans stop and louvres close. The owner was heard to say there was not to exceed 1 degree F. variation room to room, which, we believe, speaks well for the installation as also the benefits of insulating attic, and other exposures."

T. W. Torr, Dowagiac, Mich.

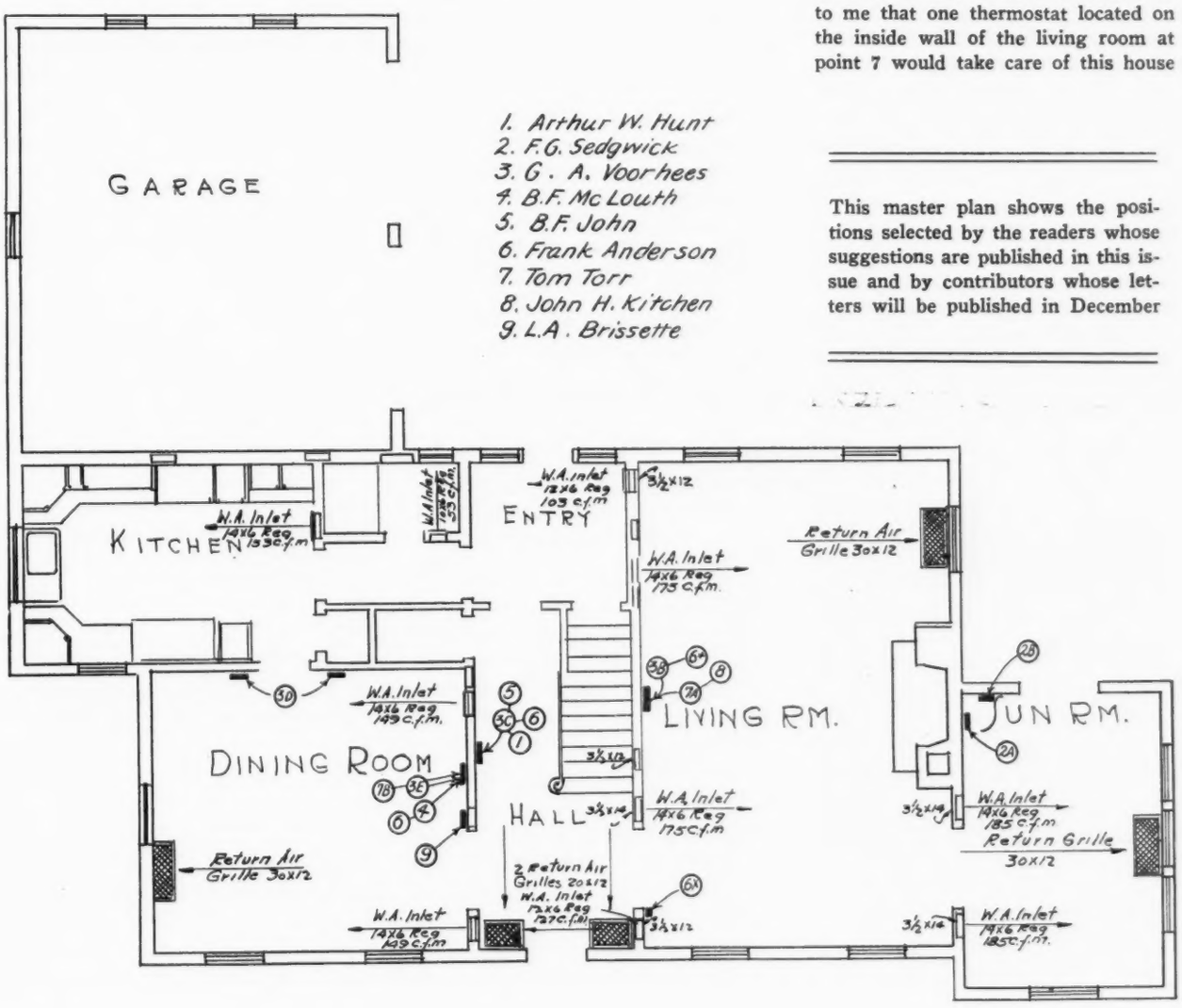
T. W. Torr, heating engineer for the Rudy Furnace Company, Dowagiac, Mich., makes two selections for location of the thermostat indicated by numbers 7A and 7B. His choice is governed by the following—

"The question of two or more thermostats in different parts of the house for maintaining even room temperatures against different weather conditions, mostly those that have been created by wind pressure, is a subject that we have given some thought to. It would seem, however, that this may be a developmenet that will take place some time in the future.

"In looking over the plan the warm air delivery seems to me to be just about ideal, for there are a number of warm air outlets, and I believe these will go farther toward keeping the house at an even temperature than anything else.

"There is also an adequate return air system and while you do not show the trunk line system no doubt the damper arrangement is provided for in the cold air system so that the flow of air through each cold air face can be equalized.

"With the proper setting of the warm air system since this house is well built and insulated it would seem to me that one thermostat located on the inside wall of the living room at point 7 would take care of this house



This master plan shows the positions selected by the readers whose suggestions are published in this issue and by contributors whose letters will be published in December

very nicely, and no matter what the wind conditions might be there would be little or not variation in the different rooms.

"Adequate insulation and properly constructed window sash makes it comparatively easy to maintain an even temperature with one thermostat with a properly set job even against very adverse wind conditions.

"If we were going to use two thermostats, for example, one located in the living room and one in the dining room, each one controlling half of the house in which it is located, then it would seem to me that each half should be supplied by a separate main duct system and a thermostat that would control the motor which would operate the valve controlling the flow of warm air in that duct. A centrally located thermostat could control the furnace drafts or gas valve which would be opereated in conjunction with a limit control.

"On a larger scale, perhaps some day we will have a thermostat in each room which will control the register valve. A system of this kind would run into considerable money and there would not be many customers for equipment of this kind."

L. A. Brissette, Boston

In Boston the Trask Heating Company has a large number of forced air installations to its credit. Many of these installations operate under unusually severe conditions. L. A. Brissette of the Trask Company selects position number 9 providing the second floor riser can be moved one or two joist spaces to the rear. His analysis reads—

"In considering the house shown on the plans, owing to the lack of a basement plan, it is assumed that the furnace is located under living room and connected to the main chimney. Hence the longest horizontal ducts would be to dining room and kitchen on first floor and the bedrooms over them on second floor.

"We would eliminate the second floor from consideration as a location for a thermostat, because there are bedrooms and bath only here, and these rooms are not as a rule suitable for temperature control on account of the open windows at night and when airing out in the morning.

"We then consider the first floor and room by room.

No. 1. Sun room—Not good. This room is bound to have a more varying temperature. On a warm, still, sunny day, the temperature will rise some degrees above seventy. When it is cold and windy with no sun, again the temperature of this room will be effected more than it is in the main house.

No. 2. Living room—Not good. Too hot on sunny windless days. Too cold on cloudy breezy days.

No. 3 and No. 4. Hall and Entry —Not good. Too protected by dining room and living room; lacks sufficient glass and outside wall to be responsive to outdoor temperature, sun and wind. Liable to be draughty when front door is left open or bedroom doors and windows are left open at night or in airing out in the morning.

No. 6. Panty—Never used for temperature control.

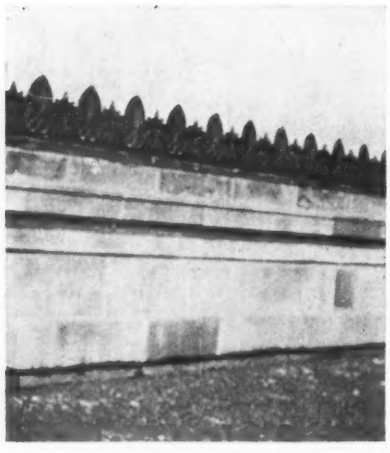
No. 7. Kitchen—Rarely used for thermostat location. Subject to extremes of overheat when cooking is in progress and cold when airing out cooking odors.

No. 8. Dining room—This room seems best suited for location of thermostat. It has two outside walls with a rather northwest exposure and three fair sized windows. It is also removed from the vicinity of the heater, and in the portion of the house that is hardest to heat.

The location by the doorway to hall puts it in a place where there is good air circulation. The dining room return air grille drawing the heat in that direction and the two cold air grilles in the hall pulling that way would cause a very active circulation at the point of thermostat location, and should give a fair average for this house.

"As to the advisability of using two thermostats in this house, I would be very much against it, as there is nothing to be gained and no other really suitable location for a thermostat. It is recommended that the riser going up in dining room wall to the second floor bedroom No. 103 be moved to the second next bay to avoid heat back of the thermostat."

Copper Cresting on Court House (*Continued from page* 19)

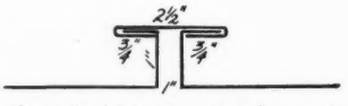


This photograph of the back side of the stamped cresting shows the general design and the coping sheet which extends from the stamped sections across the parapet wall

This high roof is surrounded by a parapet wall ornamented with a stamped cresting. This cresting was stamped from specially designed molds by the Friedley-Voshardt Company of Chicago.

The front face of the cresting is carried down over the masonry in the form of a turned under drip about two inches deep. Since the cresting stands at the front edge of the wall a wall flashing sheet was formed by the Parmer company. The front edge is soldered to the bottom of the cresting and carried across the wall top where it is turned down the back side and caulked into a reglet.

This construction necessitates the use of holding pins at intervals to hold the cresting to the wall.



Expansion joint used on capping every 16' apart
Also used at high points of gutters. Gutters held on walls from ends of stone ¾" to allow for expansion

This type of expansion joint is used at 16-foot intervals along the wall behind the cresting. The same type is used in the gutters at the high points

Some 250 feet of cresting were required.

All copper used on the building is 16 ounce. One hundred and six sheets of 36 by 96-inch copper were used for the flashings and gutters.

Bodily Comfort

[Part IV]

By L. W. Millis

A series of articles presenting in plain language useable sales points which your customer can understand. The contractor will find the answers to most of the comfort questions raised by prospects.

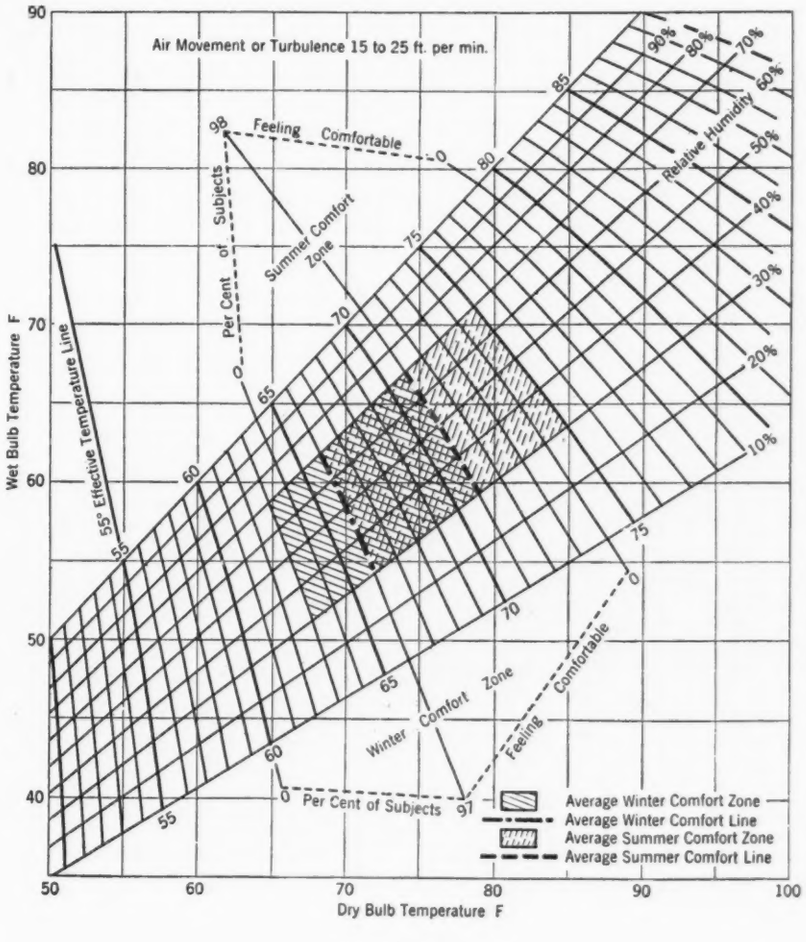
ENGINEERS through patient work on thousands of persons have been able to determine the range of temperature, wet bulb and humidity conditions in which the largest number of persons will be comfortable. You may be surprised to learn that this comfort range is considerably lower in winter than in summer. In the winter comfort is obtained with temperatures as low as 65 degrees if the humidity is up to 80%. If the humidity is down to 20%, the temperature must be brought up to 74 degrees. Due to the construction of most houses and to condensation on single glass windows, it is not practical to use a higher relative humidity than 40%. The corresponding temperature is 72 degrees. In the summer time we find a different set of figures for outdoor and indoors about as follows:

Outdoors summer deg.	Indoors summer deg.	Humidity indoors
95	80	49%
90	78	50%
85	75.5	51%
80	75	53%
75	73.5	57%
70	72	60%

You will notice that at 70 deg. outside in the summer time it requires 72 degrees for the same comfort indoors. You will also note that the comfort zone for temperature is much higher in winter than summer. During the past 75 years much progress has been made in general distribution of central heating plants for residences that come within, at least, gunshot of the comfort zone in winter. The amount of money expended for winter comfort would have appalled our forebears of two generations ago.

Nevertheless, there is still much to be desired. For summer comfort in residences, aside from air motion, little has been accomplished. It is almost certain that very soon we will be besieged with air cooling devices. We must remember that humidity plays a most important part in the comfort zone. Wringing the moisture out of a houseful of air and then losing most of it through exfiltration before it has an opportunity to act on our bodies is going to be expensive. It is possible that our generation may not see their way clear to pay the price for the few extra uncomfortable days.

It is also a certainty that we will find on the market before long, devices whose sponsors may make large claims which should be verified through other agencies or sources of information than those offered by the sellers.



Comfort or Effective Temperature Chart for Air Velocities of 15 to 25 FPM (Still Air)

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Note: Both summer and winter comfort zones apply to inhabitants of the United States only. Application of winter zone is further limited to rooms heated by central station systems of the convection type. Application of summer comfort zone is limited to homes, offices and the like, where the occupants become fully adapted to the artificial air conditions.

Fan Physics

[Part III]

By Platte Overton

IN discussing fans we frequently use the expressions "outlet velocity," "tip speed," "revolutions per minute," "brake horsepower," "efficiency."

Outlet velocity is, of course, the velocity at the discharge of the fan and we may calculate this velocity fairly accurately by dividing the c.f.m. by the area in square feet of the fan discharge.

Example: c.f.m. = 1600. Fan discharge is 14x14 inches.

$\frac{14 \times 14}{144} = 1.36$ sq. ft. $\frac{1600}{1.36} = 1176$ feet per min. outlet velocity.

The recommended outlet velocities for mechanical and air conditioning systems depends somewhat on the volume of air (c.f.m.) and the static pressure loss of the system. The following is typical of good practice:

Static pressure in inches of water	Outlet velocity in feet per minute
¼	1000-1100
⅜	1000-1100
½	1000-1200
⅝	1100-1300
¾	1200-1400
⅞	1300-1600
1	1500-1800

Tip speed is the speed in feet per minute of the periphery or the edge of the wheel. We calculate the tip speed in feet per minute by multiplying the circumference of the wheel in feet by the r.p.m. (revolutions per minute) of the wheel.

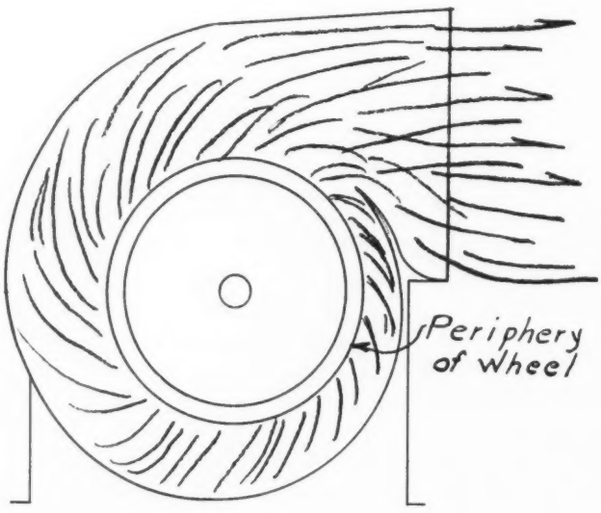

FIG. 8

This sketch shows air action inside a blower housing and indicates what and where tip speed is calculated

Example: Wheel is 15 inches in diameter (Fig. 8). R.p.m. is 450. Tip speed equals: $15 \div 12 = 1.25 \times 3.1416 = 3.92 \times 450 =$ 1764 feet per min.

The recommended tip speed for mechanical and air conditioning systems depends on the outlet velocity. The following table gives tip speed for recommended outlet velocities:

Static Pressure in inches of water	Outlet velocity in feet per min.	Tip speed in feet per min.
¼	1000-1100	1520-1700
⅜	1000-1100	1760-1900
½	1000-1200	1970-2150
⅝	1100-1300	2225-2450
¾	1200-1400	2480-2700
⅞	1300-1600	2660-2910
1	1500-1800	2820-3120

"Brake Horse Power"—We note this expresion in the majority of fan catalogs where the performance tables are given and is abbreviated as B.H.P. The phrase is derived from the type of apparatus used in testing. Fig. 11 is a sketch of a shop-made friction or brake testing apparatus. The pulley "c" rotates in the direction indicated by the arrow. While the pulley "c" is rotating the load is applied by turning the screw "e" and is measured by the reading on the scale. The reading will of course be in pounds or foot-pounds. The

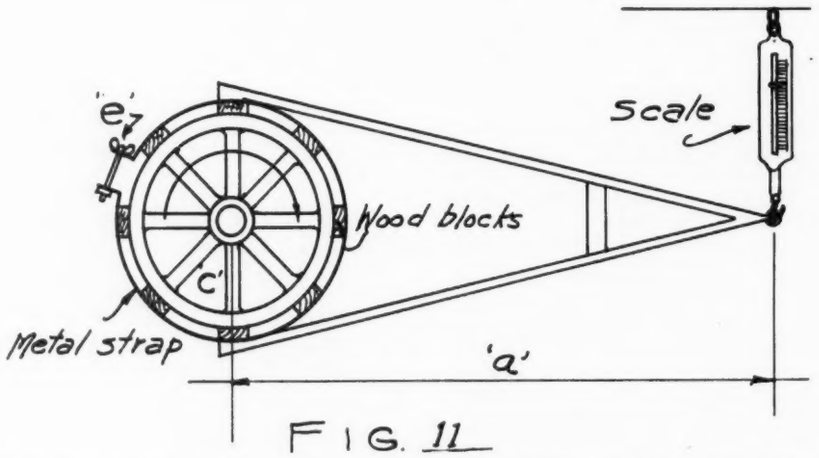

FIG. 11

This diagrammatic sketch shows how any power producing unit is tested for brake horsepower. Actually, of course, more scientific instruments are used but this shows the principle

brake horse power is calculated from the formula:

$$\text{b.h.p.} = \frac{2\pi a n W}{33{,}000}$$

where: **a** = length of brake arm in feet ("c")
n = revolutions per minute
W = net load on scales
$\pi = 3.1416$

Example: Pulley on fan is rotating at 400 revolutions per minute. Length of brake arm is 4 feet 0 inches, weight on scales is 1 pound 12 ounces; hence we have $\frac{2 \times 3.1416 \times 4 \times 400 \times 1.75}{33{,}000}$

$= 0.54 +$ B.H.P.

"Efficiency"—The mechanical efficiency of a fan is the ratio of the brake horse power to the delivered horse power. Thus if we have a fan that is delivering 3,000 c.f.m. against .35 inches of water,

we have $\frac{.02 \times 144}{16} \times 3000 = 5400$

foot-pounds. $\frac{5400}{33{,}000} = 0.1635$ H.P.

If under test our B.H.P. is shown as .24 we have $\frac{.1635}{.24} = 68\%$ mechanical efficiency. This loss of 32% may be due to friction in the bearings, design of the blades, shape of the wheel, or shape of the scroll, or possibly all of these items may accumulate in one blower.

FIG. 10 · Shows apparent effect of pressure variations between "static" and "velocity"

When velocity pressure is high and static pressure is low the draft is always into the tube. Just the opposite effect is set up when these pressures are reversed

Fan efficiency as high as 73% has been recorded. Manufacturers generally indicate the most efficient operating point of their fans by bold figures in the capacity tables, Fig. 12.

Where very small fans move relatively small volumes of air—500 to 1200 c.f.m.—efficiency of fan performance may be drawing the matter to an unnecessarily fine point, but in larger volumes efficiency of operation is not to be overlooked.

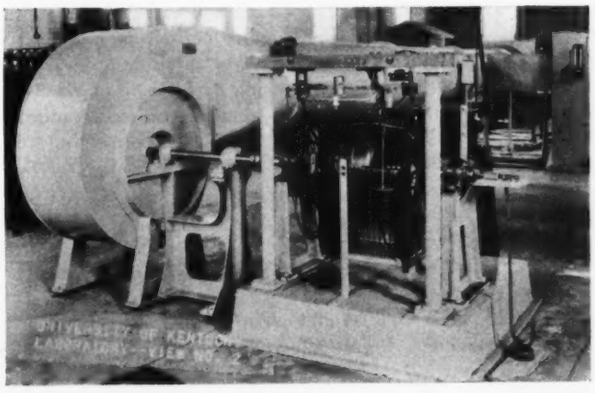

Fig. 13
Left is a photograph of a blower being tested for capacity, air flow, etc.

Fig. 13 is a photograph showing the arrangement of a typical blower for testing. In the picture we see the motor and scale for calculating the B.H.P. Such a machine is called a dynamometer and is a vast improvement over the crude apparatus shown in Fig. 11. From such tests the performance tables mentioned are derived.

"Fan design"—Any discussion under this head will be understood to be entirely superficial. Be that as it may, the following items must be the basis for any type or design. They are: cost, size and weight, speed, efficiency, quietness of operation. This last item is of extreme importance.

Noise

Noise in fan operation is generally the result of excessive tip speed, insufficient size, or operation beyond that of maximum efficiency. Some degree of noise is permissible. In residences, churches, etc., it should be the minimum. In schools, factories, restaurants, noise in fan operation is not so important. Bearings in some cases are noisy, but this item can be corrected by first class manufacturers before the fan leaves the factory.

Volume Cu. Ft. per Minute	Outlet Velocity Ft. per Minute	Add for Total Pres	¼" S. P.		⅜" S. P.		½" S. P.		⅝" S. P.		¾" S. P.		⅞" S. P.		1" S. P.	
			R PM	BH P	R PM	BH P	R PM	BH P	R PM	BH P	R PM	BH P	R PM	BH P	R PM	BH P
34800	1000	.063	**67**	**2 32**	**78**	**3 14**	**87**	**3 97**	98	4 97	....	....	....	....	....	....
38280	1100	.076	69	2 81	79	3.63	88	4 48	**98**	**5 46**	107	6 58	....	....	....	....
41760	1200	.090	71	3 22	81	4.15	89	5.08	99	6.10	107	7.12	116	8.30	125	9.72
45240	1300	.106	74	3.82	83	4 83	92	5.72	100	6.80	**109**	**7 88**	116	8.98	124	10.30
48720	1400	.122	76	4.33	86	5.46	94	6.43	101	7.55	110	8 62	**117**	**9.80**	124	11.05
52200	1500	.141	79	5.02	88	6.18	96	7.26	103	8.45	111	9.65	118	10.78	**125**	**12 15**
55680	1600	.160	82	5.80	91	7.00	98	8.35	105	9.38	113	10 65	119	12.25	126	13.25
59160	1700	.180	85	6.58	93	7 85	101	9 30	108	10.55	115	11 85	121	13.10	127	14.45
62640	1800	.202	87	7.60	96	8.82	103	10.30	111	11.80	117	12.95	123	14.35	129	15.85
66120	1900	.225	90	8 57	99	9 90	106	11 50	113	12 95	120	14.25	125	15.60	131	17.30
69600	2000	.250	93	10.00	102	11.10	109	12 60	115	14.25	122	15 80	128	17 40	133	18.70
73080	2100	.275		....	105	12 30	112	13 90	118	15.60	125	17.10	130	18 95	135	20.30

FIG. 12

This typical fan table shows how manufacturers indicate the most efficient operating speeds

What's Ahead In Air Conditioning?

Frank H. Mehrings

Address Delivered at Indiana State Convention, Jan. 17

THINK of a five billion dollar market; think of an idea commercially greater than radio, aviation or electric refrigeration—one to be classed with the automobile; think of a product which has as its ready market every enclosed space on earth where people live, work, eat or play; think of year-round comfort, where heat and cold and dryness and high humidity used to be; think of winters without colds and summers relieved from the plague of hay-fever; think of sleeping under one light blanket the year round, or commuting in comfort, of fresh cool air in subways and working in coat and vest the hottest summer's day; think of shopping, dancing, dining in mid-Summer without mopping perspiration and melting collars; think of a home where draperies and furniture stay clean of dust, where antiques don't crack apart and pianos stay in tune for years; think of a product where one sale forces others because every place lacking it is obsolete.

Think of these and you've some idea as to what's ahead in Air Conditioning "the new giant on todays' business horizon" as it is characterized in a recent issue of *Forbes* magazine in which an article by Henry W. Doyle on investment possibilities goes on to say that while a potential market of $5,000,000,000.00 may at first seem large, we realize that it is quite within reason when we stop to consider that there are 30,000,000 dwelling houses, 2,500 large theaters, 1,000 department stores, 1,500 large banks, countless retail stores, hotels, office buildings, trains, steamships, mines, subways, restaurants, dance halls, and factories—all prospects.

Air conditioning equipment as viewed from without the industry, is divided into three classes: (1) Individual units, sometimes portable, to operate for the benefit of small rooms and shops. (2) Medium-sized equipment for use in homes and small stores. (3) Large installations for theaters, apartments, office buildings, etc. And with the building of large structures almost at a standstill now because of the fact that such an abnormal amount of construction was done during the inflation years, and the probability that it will be at low levels for some time to come, the immediate market for air conditioning equipment appears to be in the smaller units of classes one and two.

When Mark Twain wrote something to the effect that "everybody talks about the weather but nobody does anything about it," he certainly wasn't thinking about the weather indoors, for men have been doing something about the weather indoors—where it is practical to do something—since prehistoric times. "Air conditioning" in fact, or modifying properties of the air in one way or another, has been practiced by mankind for thousands of years.

However, until very recent years, domestic air conditioning has been limited to heating alone while "manufactured weather" was being developed to a high degree of perfection in industries where changing atmospheric conditions due to outdoor weather were very detrimental because certain manufacturing processes such as textile, tobacco, photographic and other industries required maintaining definite standards of humidity and cleanliness as well as temperature. Theaters were among the first to adopt air conditioning for comfort and it is here that the general public has become acquainted with it. But it remained for the domestic field to develop the health appeal which is by far the strongest, especialy when combined with the appeal of greater comfort and cleanliness in the home.

Air Conditioning for Health

Once the benefits in improved health as a result of air conditioning become better known, this new adjunct to the modern home will undoubtedly increase in popularity by leaps and bounds. From a health standpoint the cleansing feature of air conditioning is the most important, for it is estimated that 60% more people die of diseases caused by contaminated air than of all other diseases. Such diseases as common colds, influenza, tuberculosis, scarlet fever, diphtheria, whooping cough and scores of others are usually transmitted from person to person by air-borne germs from out of the air and not through personal contact. In a forced warm air system equipped with filters, the air circulating three to ten times per hour, from 80% to 98% of the dust is removed with each re-circulation and with the dust any disease germs present. In addition to dust and disease germs, irritating pollens are also removed greatly to the relief of hay fever and asthma sufferers.

Equal to cleansing in importance, if not more so, from a health standpoint is proper humidification, the benefits of which are too well known to require discussion and some of the "washed air conditioners" on the market serve most admirably the two-fold purpose of cleansing and humidifying the air. Not to be lost sight of, however, is an even more tangible effect of air cleansing by filtering or washing, namely the removal of dust and soot which soils walls, draperies and furnishings, making for greatly lessened housework, less frequent redecorating expense, etc.

May Revolutionize House Design

A number of authorities believe that, in course of time, complete air conditioning will revolutionize house design. By giving the householder control of the weather indoors, it is believed, air conditioning will automatically lead to "tighter" construction, inasmuch as that would simplify the control of indoor atmosphere and make air conditioning more efficacious. As one authority writes: "The new type of construction will include complete insulation of the house to prevent loss of warmth during winter and loss of coolness during the summer. Windows will be of double construction and immovable. The use of enameled sheets, steel and other forms of air tight construction is made practicable by air conditioning. Ugly basements and cellars as we now know them will be a thing of the past, the substructure area will be available and comfortable and healthy for living or recreation rooms. The saving of space will be particularly valuable in smaller homes. Indeed, air conditioning

(*Continued on page* 49)

AMERICAN ARTISAN

Automatic Heat *and* Air Conditioning Section

We said last month in this space that we as an industry should conduct a campaign to de-bunk cooling. Admittedly, no one can de-bunk a proposition unless he knows all there is to know about the subject.

. . . . Therefore, in order that readers may know the whys and wherefores of cooling, we begin in this issue, a series of articles on cooling, written by one of the authorities of the country, and arranged to give readers actual inside information on what makes cooling tick.

. . . . H. J. Macintire, the author, is professor of refrigeration at the University of Illinois and thoroughly conversant with all the cooling research made in the research residence. He speaks, therefore, with authority.

. . . . Cooling, being a subject as intricate as heating and much less understood, is difficult to present in language and by example that we all can understand. The series, therefore, uses the research house at Urbana as an example and will show how to figure cooling based on this house. Wherever and whenever statements are made which you do not understand, write us.

Mr. Furnace Dealer:

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● As things begin to get better, the public will demand improved heating equipment as they are demanding improvement and better quality in everything they buy.

To reach this market of exacting buyers the Warm Air Furnace Industry MUST offer the most improved equipment it can produce.

What kind of a heating system is going to be purchased?

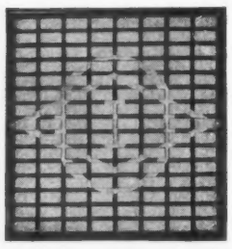
The public is rapidly becoming air-minded and with it *Clean Air Minded.* A Warm Air System which permits the circulation of dirty air is—"NOT WANTED".

Mr. Dealer—*Demand* of your manufacturer a Warm Air Furnace with "Dustop" incorporated into its standard design.

Nothing can help you more to "cash in" on this replacement business than today's Dustop Filter equipped furnace.

Owens-Illinois Glass Company, Toledo, Ohio . . . Canadian Distributors, General Steel Wares Ltd., Toronto.

Below is illustrated the standard Owens-Illinois "Dustop" glass wool air filter replacement cell. It is available in 3 sizes—low in cost—light in weight—easily replaced.



We do not manufacture or sell the "Dustop" Gravity Filter Casing. We recommend it as the perfect means of installing our "Dustop" air filters in gravity warm-air furnaces. Designs for this casing are available without cost only to manufacturers of warm-air furnaces. We will assist in designing this casing into the furnace of any manufacturer without charge.

Illustration shows compactness of Dustop Gravity Filter Casing on the standard type of warm-air furnace. It requires less space than standard return boot connection.

OWENS-ILLINOIS

AIR FILTERS

1873 *SIXTIETH ANNIVERSARY* *1933*

Comfort Cooling

This article is the first of a series in which the general problems of comfort cooling for residences will be discussed. The articles will also outline in some detail results established in previous test houses. An important feature of this series will be the complete calculations for the design of a cooling system for an average house using the common cooling media. The author, Professor H. J. Macintire, of the University of Illinois, is one of the country's foremost refrigerating engineers.

By H. J. Macintire

COMFORT COOLING of residences is just as much a problem in engineering as is heating and ventilation and at the present time the factors involved are not as clearly understood as are those affecting heating. The problem of cooling appears simple and easy, but it may not be simple and the results will most certainly be unsatisfactory unless the proper details are worked out correctly.

In order to discuss cooling so that all factors are easily understandable, let us assume that we are called in to give an estimate and design a system to cool a typical residence. To make this problem still clearer let us assume that the house we are going to cool is the Research Residence at Urbana. In the articles which follow we will design a series of systems using different cooling media for this house.

The research residence was built and opened in 1924. It is in excellent condition at the present time. The building is of standard frame construction, but it uses 2 by 6-inch studding. The wall construction consists of weather boarding, building paper, studding, wood lath and plaster with a rough sand finish, and the overall coefficient of heat transfer, U, is calculated to be 0.262 B.t.u. per sq. ft. per degree difference of temperature per hour. There is no insulation in the walls, but there is 1 inch of insulating quilt in the ceiling below the attic space and there is no weather stripping on the doors or windows.

For the purpose of comfort cooling during the summer of 1932 the third floor was closed off by means of a door at the top of the stairs and the sun porch on the west side was closed off by means of doors connecting to the dining room, thereby permitting three rooms on the first floor and three on the second to be comfort cooled which, with the connecting halls, consisted of approximately 14,170 cu. ft. total of cooled space. The kitchen of the research house was not used for cooking purposes, but the house was used during the summer research period with two or three persons continuously. (See Fig. 1.)

For the purpose of comfort cooling, ice was chosen, using the regular warm air furnace with its usual cas-

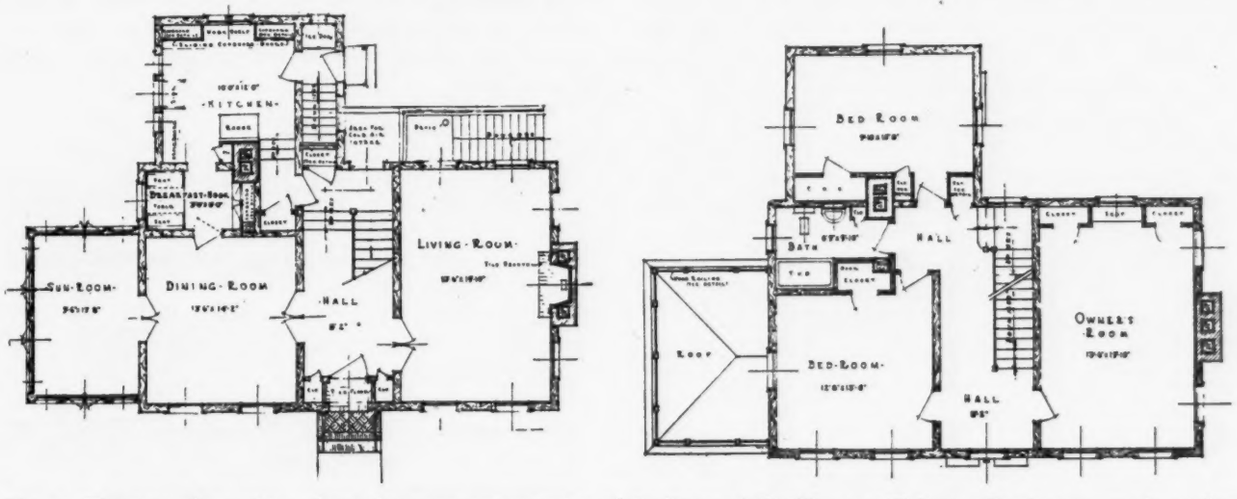


Fig. 1—The two plans above show the room arrangement of the Research Residence at Urbana. For last summer's cooling tests the sun room on the first floor and the dormitory on the third floor were closed off. A somewhat lessened cooling load was required because the kitchen was not used for cooking and no heat producing work was done in the basement

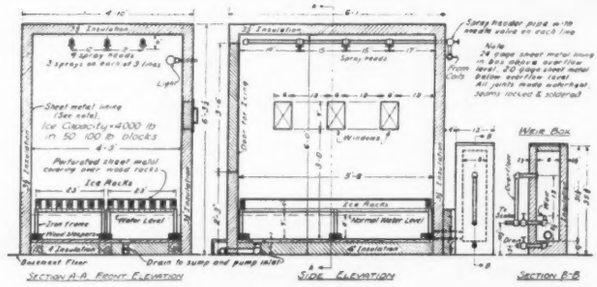


Fig. 2—This drawing shows the size and construction of the ice chamber in the Research Residence. The method of using the cooler is explained in the text

ing, stacks and registers, the latter being with one exception of the baseboard type. A fan, driven by a ¼ H.P. motor, circulates the air with a maximum capacity of 1,475 cu. ft. per minute and delivers this air into the rooms with velocities at the register faces of from 50 to 450 feet per minute and a temperature of from 60 to 70 deg. F. All the air was recirculated and part only was cooled by by-passing through a 473 sq. ft. cooler containing two sections of three rows each set in headers of ¾-inch copper tubing having helical fins. No outside air was used except during certain periods, as for example at night when the outside air was suitable for cooling.

The water temperature in the coils was about 35 degrees, and if the air delivered to the registers was not lower than 60 degrees F. 396 gallons per hour were required in the coils. The ice box has a capacity of fifty 100-lb. ice blocks. Water was introduced through three pipe lines with three spray heads each. The box is lined with 24-gage sheet metal and has a 3½-inch insulation all around it except on the bottom where it is 4 inches. The ice rests on wooden racks which in turn rest on perforated sheet metal, and a centrifugal pump circulates the ice water from the bottom of the tank, through the copper tubing and then to the sprays. (See Fig. 2.)

How Tests Were Run

In conducting the tests the windows and doors were kept closed and awnings were used over the windows most of the time for such windows on the east, south and west sides exposed to direct solar radiation. Careful calculations from observations over a period of time indicated a change of air due to infiltration ranging from 0.7 to 1.0 air changes per hour which compares with the value given in the A. S. H. & V. E. Guide of from 1 to 1½ volume changes for similar construction and an amount that is sufficient for a house of this type when used as a residence and to be occupied by a small family.

In most residences other factors have to be considered carefully that were neglected in the research house. The heat from the kitchen from the preparation of the food, the heat resulting from ironing, the heating of water for various washing operations are some of the minor sources tending to increase the dry bulb temperature and the percentage of humidity in the house. Undoubtedly the doors in the ordinary residence will be opened more regularly and kept open longer. The housewife insists on opening the windows for "airing" and on permitting direct sunlight to enter the house part of the time because of its "health" properties.

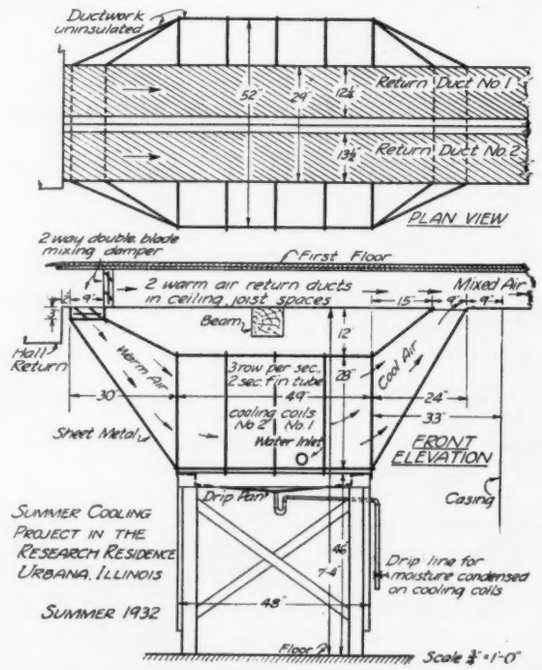


Fig. 4—The Research system cools only a portion of the circulated air. The portion to be cooled is passed through 473 sq. ft. of coils through which the ice water is pumped. From the coils the cooled air is re-introduced to the warm air duct to mix with the air not cooled

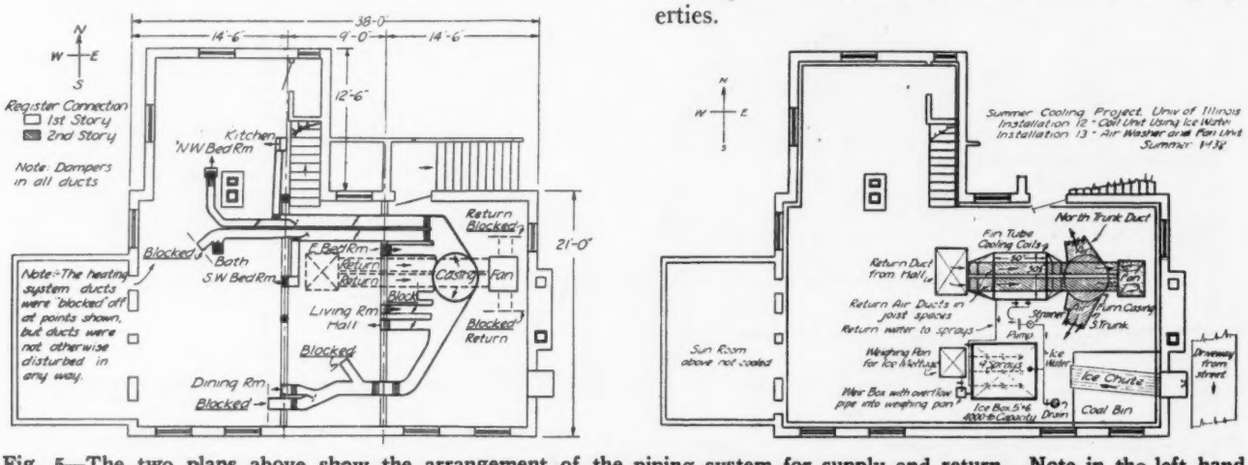


Fig. 5—The two plans above show the arrangement of the piping system for supply and return. Note in the left hand plan how the large return from the hall passes above the furnace. The right plan shows the location of the ice chamber and cooling chamber. Suitable notations on the plans explain the arrangement of supply and return during cooling

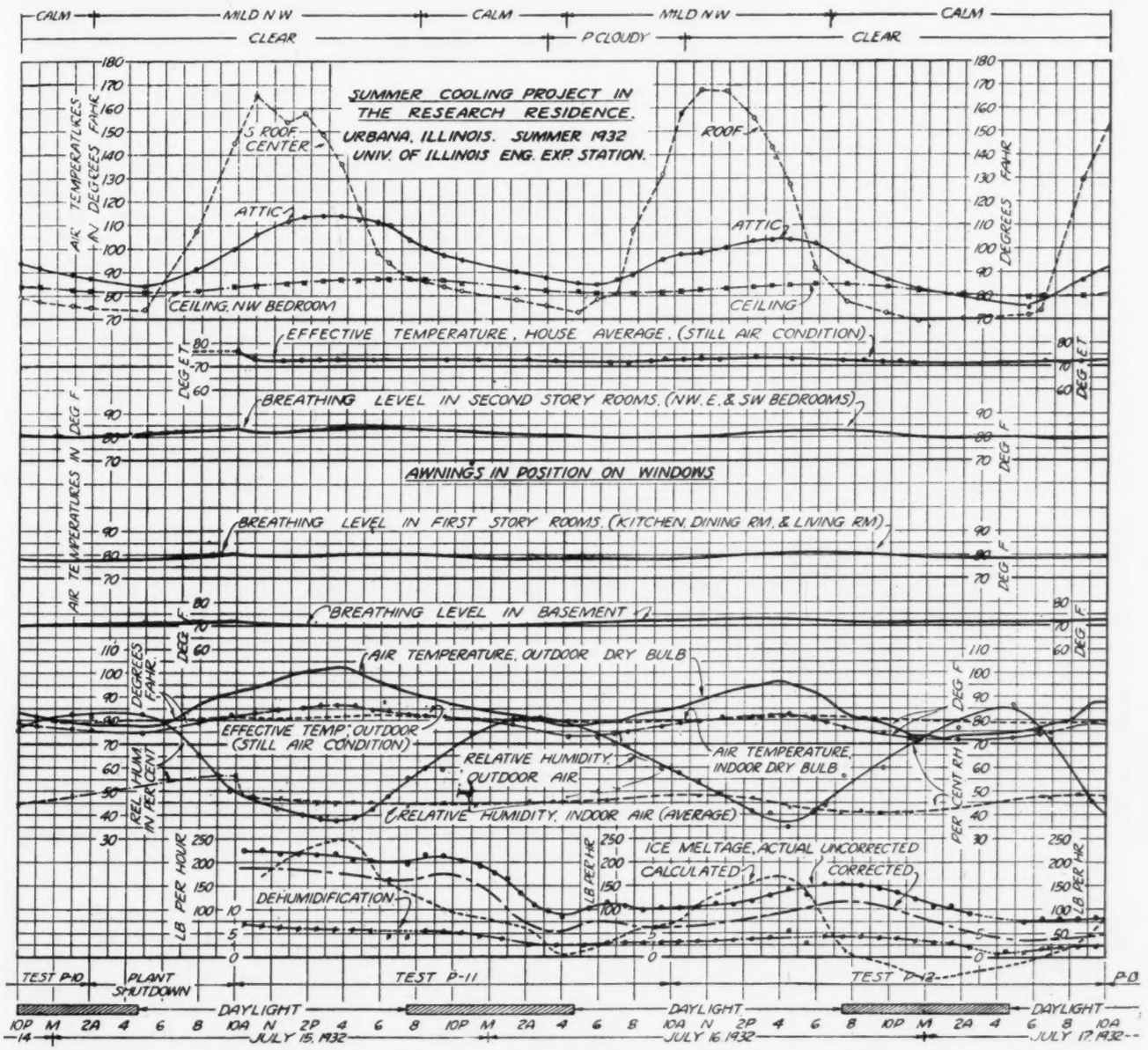


Fig. 3—This graphic log of observations taken July 15, 16 and 17, is one of the most complete analysis of a residential cooling system operation so far charted. Practically every contributing factor is accounted for on the chart. A full explanation of the chart is discussed in the text

Fig. 3 gives the results of a typical run of the research on comfort cooling, for operation with awnings, showing temperatures, humidities and ice meltage both calculated and actual. The actual meltage is corrected for certain basement losses mostly due to test conditions not necessary in an actual residence, the amount of which was placed at 6,600 B.t.u. per hour.

Fig. 3 indicates that an effective temperature of about 72 deg. F. was maintained with about 80 degrees dry bulb at the breathing line and about 45 per cent humidity. Undoubtedly a slightly higher effective temperature could have been carried, but how high was not determined. The water vapor entering with the air of infiltration and that exhaled by the occupants of the house accounted for 20 per cent of the entire cooling load. In addition to the moisture entering the house the cooling load consists of the heat leakage, the sensible heat in the air entering from the outside, direct radiation (taken as zero in the case of the research when equipped with awnings), the effect of illumination, power, water heating and cooking, electric irons and people present.

Fig. 3 shows that the roof, which is made of copper, attained a maximum temperature of about 165 degrees and that the average for the day time was from 115 to 120 deg. F. Without question the outside walls of the residence will assume some temperature above the dry bulb temperature in the shade and for summer conditions this could be taken as 115 degrees for a location similar to Urbana, Illinois. The average dry bulb temperature is seen also to be from 90 to 95 degrees during the day time. The temperature difference, (t_m), for that wall and roof area *not* exposed to direct radiation from the sun may be taken as 10, and the remainder which is assumed to be exposed to direct radiation as 25.

The heat leakage is, then,

B.t.u. per hr. = Area of wall or roof in sq. ft. x U x t_m

where U may be found in the "Guide" published by the A. S. H. & V. E. for the particular roof or wall

Date	Test No.	Start of Test	Length of Test Hours	Outdoor Temperature			Indoor Temp Aver.	Aver Temp Diff In—Out	Aver. Humidity		Ice Meltage		Dehumidification Total Lb	Hourly Heat Leads					
				Max During Test	Min During Day	Aver During Test			Outdoor Aver During Test	Aver Indoors	Equiv Total Lb	Corr for Basement Loss Lb		Uncorrected		Corr. for Basement		Corr. for Basement	
														Total	Sensible	Total	Sensible	Total	Sensible
														Btu per Hour				Btu per Degree per Hour	
7-7	P-4	10:45A	8.0	88.0	73.5	83.8	77.7	6.1	46.2	63.4	1060	701	32.19	19225	15000	12625	8400	2070	1377
7-9	P-5	1:15P	10.0	87.0	62.5	81.2	75.5	5.7	69.7	56.1	1459	1001	38.24	21000	16980	14400	10380	2526	1821
7-10	P-6	1:25P	4.0	90.5	70.5	86.3	77.2	9.1	65.6	60.4	472	289	20.51	16975	11590	10375	4990	1140	548
7-11	P-7	2:00P	6.0	85.0	66.5	81.5	78.2	3.3	47.4	53.3	907	632	27.82	22885	18010	16285	11410	4937	3456
7-12	P-8	2:00P	7.5	93.5	59.5	86.4	77.0	9.4	58.1	51.9	1318	975	41.40	25300	19500	18700	12900	1989	1372
7-13	P-9	9:30A	13.5	99.0	70.0	91.0	78.4	12.6	58.0	50.8	2642	2024	97.96	28180	20560	21580	13960	1712	1108
7-14	P-10	11:40A	14.25	99.0	75.0	89.4	81.1	8.3	62.8	49.2	3050	2397	113.23	30820	22470	24220	15870	2917	1912
7-15	P-11	10:00A	24.0	103.0	78.0	88.8	80.8	8.0	59.9	46.2	4243	3144	111.56	25450	20400	18850	13800	2356	1725
7-16	P-12	10:00A	24.0	97.0	77.5	83.2	80.0	3.2	59.1	45.1	2713	1614	76.48	16280	12930	9680	6330	3026	1978
7-17	P-13	10:00A	12.0	90.5	72.5	85.8	80.7	5.1	37.3	44.0	1261	711	30.31	15130	12480	8530	5880	1673	1153
7-20	P-14	9:00P	24.0	98.0	78.0	86.7	80.0	6.7	60.5	42.9	3530	2431	109.04	21170	16410	14570	9810	2174	1464
7-21	P-15	9:00P	24.0	97.5	74.0	83.9	79.2	4.7	55.4	43.3	3320	2221	88.94	19920	16030	13320	9430	2833	2005
8-10	P-20	9:30A	12.0	91.0	67.0	83.1	76.4	6.7	73.4	48.8	1761	1211	61.11	21120	15775	14520	9175	2166	1369
8-15	P-21	9:30A	10.5	87.0	62.0	81.8	75.6	6.2	71.5	50.4	1238	757	35.49	16975	13425	10375	6825	1674	1101
8-16	P-22	9:00A	13.5	90.0	72.0	84.0	77.1	6.9	76.3	48.6	2025	1407	60.71	21600	16880	15000	10280	2173	1489
8-23	P-24	10:00A	11.0	87.5	57.5	80.9	74.9	6.0	52.5	44.4	1838	1334	40.64	24060	20180	17460	13580	2908	2262
8-24	P-25	10:00A	11.0	90.0	60.0	83.5	75.1	8.4	52.3	46.0	1464	960	35.01	19170	15830	12570	9230	1496	1098
8-25	P-26	9:00A	13.0	89.5	69.0	83.6	77.3	6.3	63.5	48.1	1578	983	45.01	17470	13835	10870	7235	1725	1148
8-26	P-27	9:00A	12.0	87.0	67.5	80.8	76.6	4.2	69.0	46.5	1513	963	41.44	18155	14525	11555	7925	2751	1886
8-29	P-28	7:00A	24.0	94.0	75.0	82.7	78.0	4.7	74.2	47.2	3680	2581	104.77	22090	17500	15490	10900	3295	2318
8-30	P-29	7:00A	24.0	95.0	73.0	81.9	77.9	4.0	72.2	47.4	3752	2653	109.39	22500	17720	15900	11120	3975	2780
8-31	P-30	7:00A	24.0	93.0	71.5	79.0	77.1	1.9	74.1	45.9	3237	2138	87.15	19420	15600	12820	9000	6750	4737

Notes: Basement loss approx 6600 Btu per hour or equal to an ice meltage of 45.8 lb per hour. Total Correction = (No. of hours) (45.8).
Test P-16 on 7-22-32 and Test P-23 on 8-17-32 omitted due to unfavorable change in weather conditions.
Test P-17, P-18, and P-19 on 7-26, 7-28, and 8-5-32 respectively omitted on account of incomplete data.

Table 1—The principal results of all cooling tests are given in this table. The results obtained furnish a good cross section of the average cooling problem and the results which may be anticipated

in question. The value of U for walls with a construction similar to the research residence is given as 0.262 in table 21 of the Guide.

We must always consider infiltration because the air entering through cracks around windows and doors as well as the wall and perhaps the roof on the side of the house exposed to the prevailing wind brings in heat; an amount approximately equal to one-half of the perimeter of the structure. For wood sash, single glass, double hung windows the infiltration at 15 miles per hour air movement is given as 22.6 cu. ft. per hour per one foot of crack around uncalked frames and 124 cu. ft. per hour per foot of crack around the sash (the perimeter of the sash plus the length of the meeting rail). The loss around the doors is usually taken as twice the loss around a window, per foot of crack.

The heat load added due to the entrance of hotter air from outside is calculated from the following formula.

Infiltration = 0.018 times the cu. ft. of air entering times $(t\text{-}t_o)$

where $(t\text{-}t_o)$ is the temperature difference between the outside and the inside air temperature and this is to be taken as 10 degrees F.

Moisture Removal Calculations

In the research house the value of the amount of cu. ft. of air entering was found to be approximately ¾ the inside volume of the house per hour. Table 1 shows the amount of moisture condensed out of the air by the cooling coils varied from 30.3 to 113.2 lb. during the test period, the greater part entering with the air from the outside. This can be seen easily if one considers that according to the psychrometric chart at 40 per cent humidity and 100 deg. F. the amount of water vapor is 118 grains per one pound of bone dry air, where 7,000 grains = 1 lb., whereas, with the condition in the house during test at 45 per cent humidity and 80 degrees the moisture content is 70 grains. The weight of moisture entering can be calculated as soon as the inside and outside conditions are known and the amount of cooling required is calculated from the product of the weight of water vapor in pounds and the latent heat of liquefaction which is about 1,040 B.t.u. per pound. The amount of cooling required can be found also from the psychrometric chart, per pound of bone dry air, by reading the difference in the "total heats" as will be shown later.

In the case of direct radiation, or sun heat effect, for the latitude af Urbana, the value of 160 B.t.u. per sq. ft. of glass on the east and west sides, and 140 B.t.u. on the south side, for the glass actually exposed appears to be authentic. If there are overhanging ledges above the windows, or trees or adjoining buildings these must be taken into account as the effect will be to give more or less shade.

The heat due to illumintaion, or in general to all power, is practically 3,415 B.t.u. per kw. hour. Heat due to hot pipes, to heating of water, to cooking, etc., must be calculated according to detailed information. Heat due to people present is usually taken as 400 B.t.u. per person per hour.

At the present time there are three principal

(*Continued on page* 44)

One more article will conclude this series by Malcolm Tomlinson. The last article will cover testing for humidity and humidity calculations. Many of the charts published in this series have appeared for the first time and give in chart form information usually available only in complicated formulas or tables. We realize that in the small sizes printed accurate usage is difficult. Readers desiring any particular chart in large size should write to the editors.

By Malcolm Tomlinson

Principles of Humidification

THERE is a principle of evaporation which has not, so far, been mentioned in these articles. *More water will be vaporized when air passes through the water or when it impinges on the surface of the water than when it passes over the surface of the water parallel to that surface.*

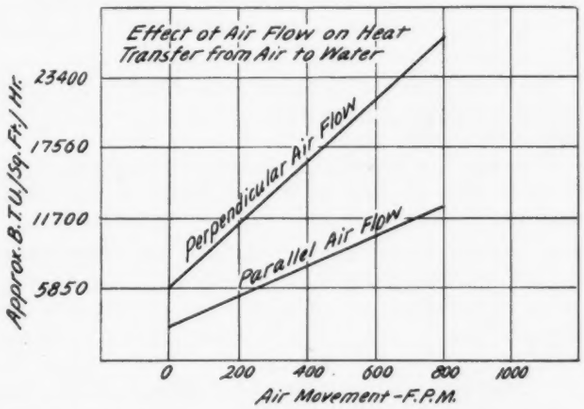


Fig. 1—Since the heat transmitted to water by air is proportional to the evaporation secured, this chart shows the benefits had through perpendicular air flow. Note, also, how transfer increases with increased air velocity

This principle is well illustrated by Fig. 1, where we see the approximate heat transmitted by air when its flow is perpendicular to, or parallel to, the water surface.

The air washer is an excellent example of the working of this principle for here we have air flow approximately perpendicular to the plane of the dispersion of the water vapor by the air nozzles.

There are three general types of air washers. One is used mainly for washing, or scrubbing, the air. It usually has only one bank of spray nozzles, but it is also equipped with an extra row of nozzles which wash, or flood, the eliminator plates. A cross section of the eliminator plates, which shows clearly how they stop particles of water in the air stream, is shown in Fig. 2. The scrubber type of washer is usually about 70% efficient.

A second type of air washer is longer than the scrubber (or higher if vertical in design). It has no provision for flooding the eliminator plates, but it has from two to three banks of nozzles. This type of washer ranges, in efficiency, from 80 to 95% and is suitable for humidification and dehumidification purposes.

A third type of washer is quite short, has no flooding nozzles and only one bank of nozzles for spray pur-

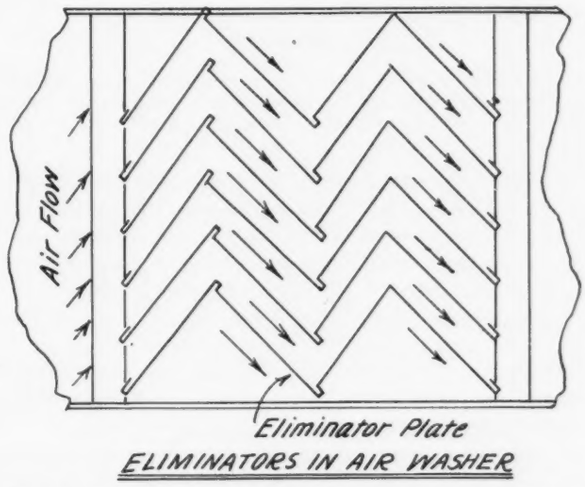


Fig. 2—Here is a horizontal section through the eliminator section of an air washer of the horizontal type. Note the fins which catch water particles in the air stream. Eliminator sections vary from one turn to several turns

poses. Here the water pressures are higher than in the other two types previously described. Washers of this type have efficiencies about the same as scrubbers and are used for humidification and dehumidification purposes.

What Is a "Bank" of Sprays?

A "bank" of spray nozzles needs explanation. The nozzles, by means of piping for their water supply, are arranged in rows and columns and these rows and columns are in a plane perpendicular to the sides of the spray chamber. In other words, a bank of nozzles consists of a number of rows and columns of nozzles arranged in such a manner that the nozzles are all located in the same cross section of the spray chamber and also that the rows and columns are uniformly spaced. In this manner a uniformly distributed spray from the nozzles covers an entire cross section of the chamber. The arrangement of the nozzles can be seen in Figs. 3 and 4. Fig. 3 gives the cross section arrangement while Fig. 4 shows a longitudinal section of the washer with the temperature gradient from entrance to exit.

It is apparent that the most efficient washers are those with more than one bank of spray nozzles. This is further evidence of the efficiency of evaporation through perpendicular air flow.

Suppose we turn for a moment to consider water

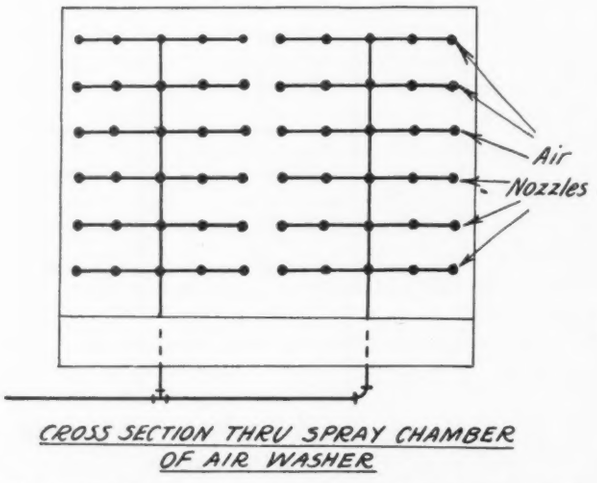


Fig. 3—This diagram represents a "bank" of spray heads. In commercial washers the number of nozzles varies from one to a dozen or more spray heads

pans and automatic humidifiers in the light of the evidence just presented. With water pans the air flow is perpendicular to the surface but *the air does not impinge on the surface of the water nor does it pass through the water.* The same restriction applies to automatic humidifiers. This is the reason why the efficiency of vaporization, or evaporation, for such pans and humidifiers is low. The efficiency of such devices can be increased where impingement or through flow in the water can be assured.

Air washer control is generally based either on the dew point or the wet bulb depression. You will recall that the dew point is the temperature at which, if an *unsaturated* air-water vapor mixture is cooled, saturation is reached. It is the dry bulb temperature

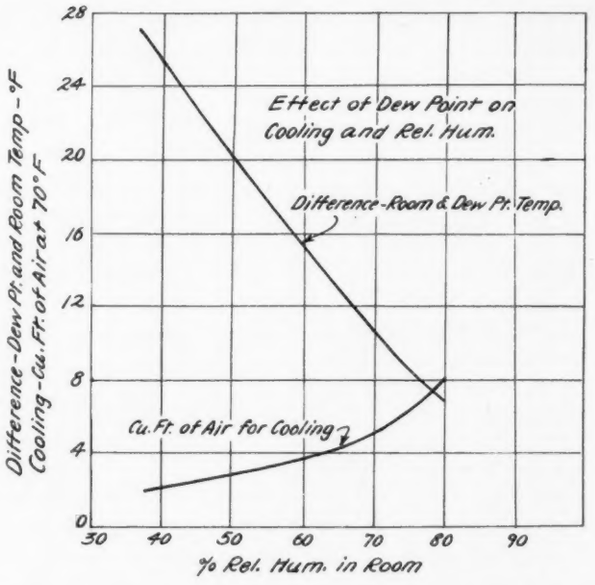


Fig. 5—The Dew Point is an important factor in all cooling processes. The warmer the water the less the difference between room and water temperatures and the higher the relative humidity. The greater the humidity, the faster must be air motion in order to give a sensation of coolness

at which air in a saturated condition contains exactly the same moisture as it had in a particular unsaturated mixture at a higher temperature.

Importance of Humidity

It has been shown that the temperature difference between the dry and wet bulbs is an important factor—it indicates the relative humidity. In the same manner the difference between room temperatures and dew points indicate the probable cooling effect. Right here it is well to point out that cooling is an important consideration even in humidification wherever human comfort is involved.

In Fig. 5 will be found the effect of the difference between room and dew point temperatures on the cubic feet of air required for cooling and also on the per cent relative humidity obtained. As the temperature difference between room and dew point decreases the relative humidity rises (just as it rises with a drop in the wet bulb depression) and the cubic feet of cooling air required also decreases.

From an air washer viewpoint, then, a decrease in relative humidity reduces the air flow needed for comfort.

In Fig. 4 will be found not only the change in the dry bulb temperature through the washer, but also, above the washer sketch, a skeleton psychrometric chart which shows how these changes can be worked out in a graphical form. The assumption for these diagrams is that all air is taken from the outside at 20 deg. Fahr., that the relative humidity of the entering air is 60%, that the dew point of the desired condition is 46 deg. and that the final result is an air mixture at 68 deg. and 46% relative humidity. For protection tempering coils heat the entering air up to 70 deg.

In the above calculation it will be noticed that the wet bulb is 17 deg. for the incoming air, 46 deg. for the saturation point in the spray chamber and 57 deg.

at the washer outlet. These figures can be checked with any established psychrometric chart.

In other words, there is a progressive rise of the wet bulb for humidification in the air washer. Suppose we turn again to Fig. 5. We find the average heat transfer per sq. ft. of surface per hour for various air velocities with perpendicular and parallel flow. We have found, also, that the result for perpendicular flow is approximately the same as is had with air washers. In dehumidification, and sometimes in humidification, the entering air is warmer than the cooling water. With a heat transfer from air to water the air temperature gradually decreases, the water temperature increases and evaporation takes place. Thus the relative humidity rises. This change goes on until the dry bulb of the exit air has reached the wet bulb temperature of the entering air—provided always that the efficiency of the washer is 100%. Such efficiencies are, of course, not obtainable.

Therefore, the temperature of the exit air will never quite reach the wet bulb temperature of the entering air.

But, if the vapor mixed with the entering air is small the wet bulb temperature throughout the washer will remain practically constant and, even if this vapor is quite large, the variation or change in the wet bulb will be slight. Therefore, in dehumidification and in some cases of humidification a practically constant wet bulb temperature throughout the washer can be expected. We have already shown that the wet bulb is the temperature of "evaporation."

Therefore, in all evaporation processes, the main effort should be given to lowering the dry bulb for the beginning of the process to approximately that of the wet bulb for the entering air.

We have already seen that the efficiency of the washer is measured by the wet bulb temperatures of entrance and exit as follows:

$$E = 1 - \frac{\text{Final Wet Bulb Depression}}{\text{Initial Wet Bulb Depression}}$$

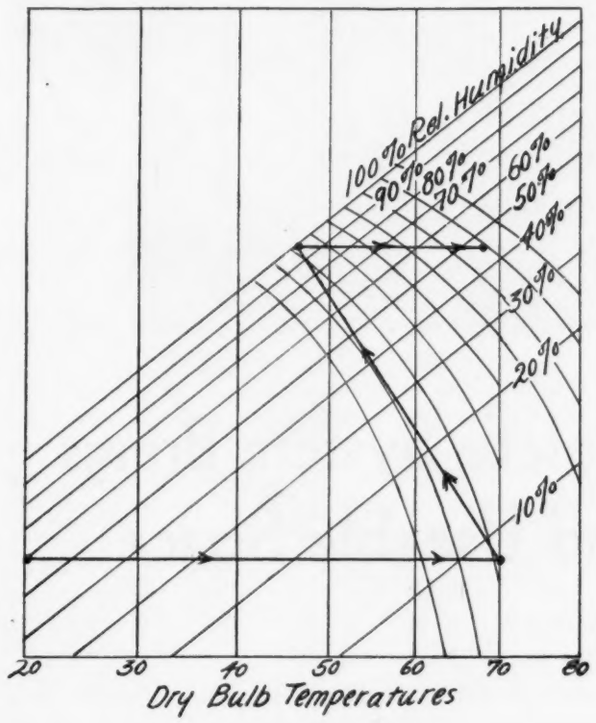
where E = efficiency in %.

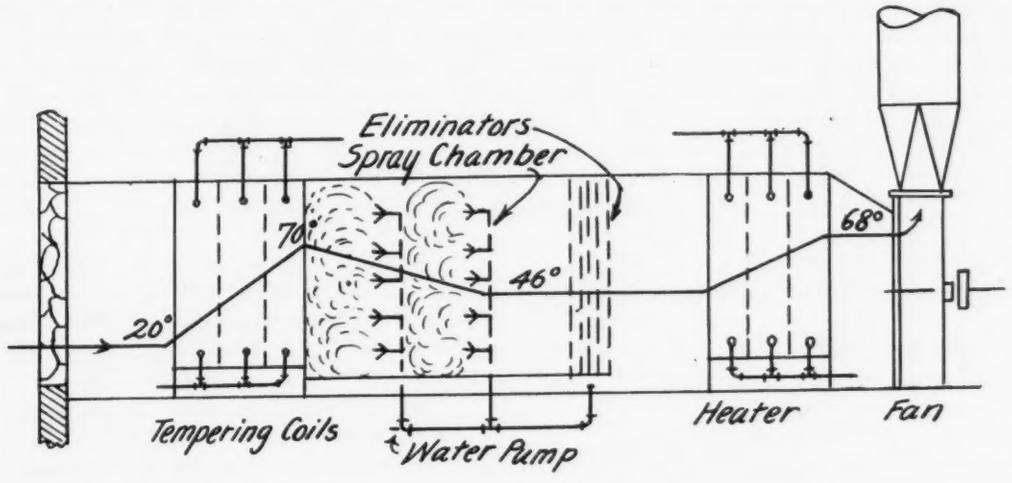
From this equation we obtain the equation for the cooling effect of a washer:

$$R = \frac{\text{Final Wet Bulb Depression}}{\text{Initial Wet Bulb Depression}}$$

where R = cooling effect in %.

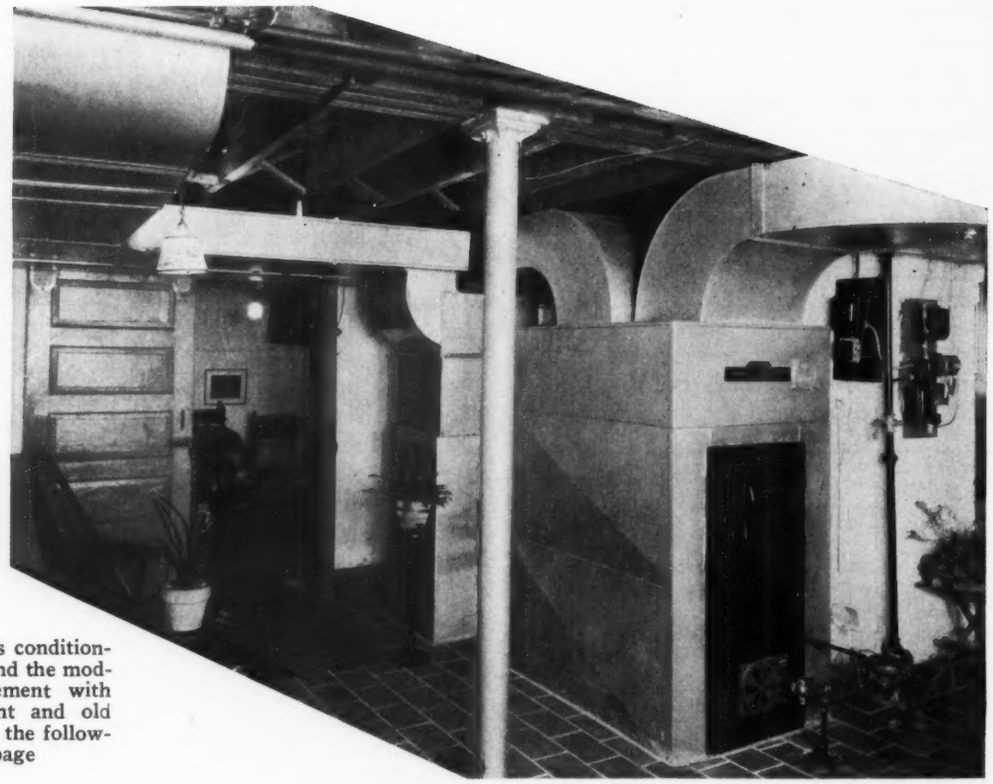
These two equations furnish a very simple means for finding out how efficient a washer can be and how well it can cool a given air mixture. Simply take dry and wet bulb readings at the entrance and exit of the washer and figure effect and efficiency as indicated.





SECTION THRU AN AIR WASHER

Fig. 4—These two diagrams show the change in air temperature as the air passes through a commercial washer. The section of a psychrometric chart above shows the same process plotted on the chart. Cooling effect and washer efficiency can be checked with formulas in the text using this process to establish the factors



Compare this conditioning system and the modernized basement with the old plant and old basement on the following page

Modernizing an Obsolete System Brings Health, Comfort and Useable Space

By B. L. Schwartz

LIKE most heating contractors, the bread and butter of our business is derived from installations which are in no way different from dozens of other installations made year in and year out. Every so often, however, a project comes up which constitutes an installation to which we "point with pride."

We have found that these interesting projects are becoming more and more frequent as remodeling and replacement account for an increasing portion of our total business. To our way of thinking, remodeling is interesting because we know all about the unsatisfactory conditions of the old plant and can try to design a system which will meet every owner specification.

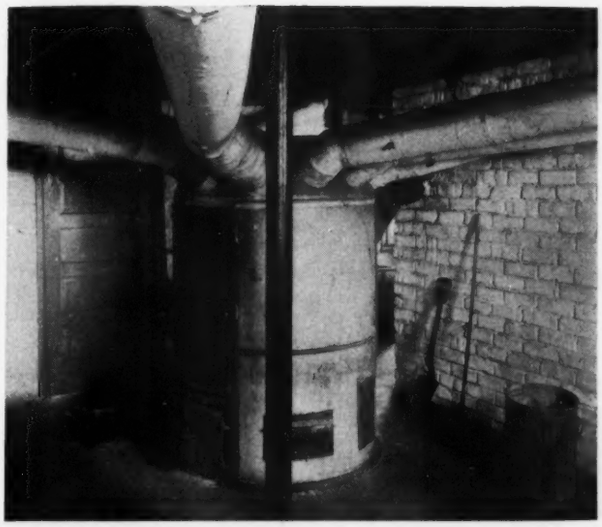
A very interesting project of this kind we recently completed in the six-room residence of John E. Crawford here in Pittsburgh. The new plant replaces a coal fired furnace which was typical of installation practices of eight or ten years back. Connections were round pipes with one leader to each room and irregularly distributed around the bonnet. Basement air was supplied to the furnace as shown in the "before" picture. The registers were all of the floor type.

The old plant was completely removed, preparatory to the installation of the new air conditioning assembly. The floor registers were taken out and the openings closed up. Wall registers were placed in each end of the bay window seat in the living room. A wall register was also placed in the center of the window seat in the dining room. Heat was provided for the kitchen, a room that was formerly unheated. A register in one of the second floor bedrooms which terminated in the center of the only available bed space in the room, was relocated to one side of the wall.

Return air outlets were provided from the living room, dining room and hall on the first floor. No returns were taken from the second floor as the stair well provided a natural outlet for the second floor rooms.

In addition to the large return air intake at the foot of the stair well there is also a side wall, warm air outlet at the other end of the small hall. The register location is such as to eliminate the danger of having the current of warm air interfere with the down coming current of cold air from the second floor.

There is no evidence of air stratification in the well. Inasmuch as the telephone is located immediately above the return air intake in the hall, any tendency



The old system used basement air, had no direct returns, and made the furnace room waste space. Still another fault with the old plant was the complaint that some rooms were never satisfactorily warm

towards air stratification or drafts would be noticed.

We believe that the answer to this condition lies in the fact that we deliver sufficient warm air to the second floor via the warm air outlets to increase the temperature of the return air to a point where it does not establish any appreciable difference in air temperatures. This is evidenced by the fact that the temperature of the return air at the floor line was 72°, when the temperatures in the rooms were from 72-74°.

The heart of the system is a complete air conditioning assembly as developed by the Pennsylvania Engineering Corporation of New Castle, Pa. It consists, essentially, of a boiler plate furnace which can be fired with coal, coke, gas, oil, wood, etc.; at the option of the owner. When gas operated, a special Sphinx burner is used for this fuel. The unit is also adaptable for stoker operation, when fired with coal.

Sells Convertibility

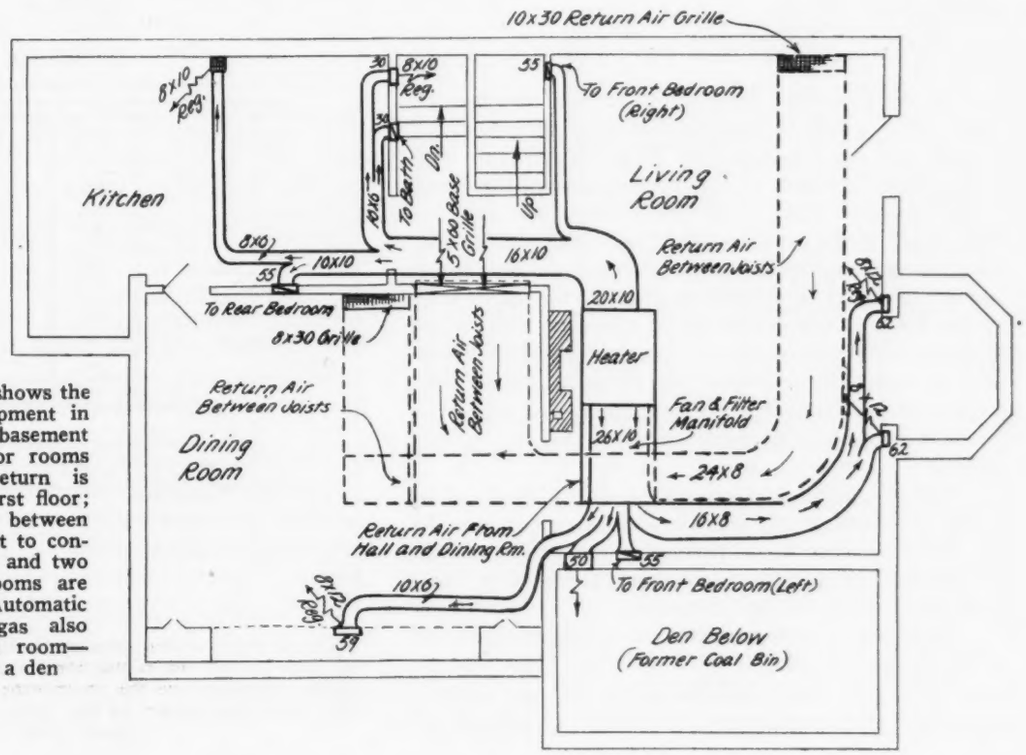
From our experience in selling air conditioning to the average home owner who may want automatic heat but is not certain he can always afford it, this convertible feature is a sales point every furnace man should stress. With the many types of heaters now on the market which are adaptable to ready conversion no heating man should overlook this strong sales point.

The heater used has an A. G. A. input rating of 132,000 B.T.U.'s. A rectangular casing houses the heater. The blower has a range of 380 to 2520 C.F.M. at ⅛-inch static pressure. The motor operates at speeds ranging from 445 to 775 R.P.M.

The blower is encased in a special boiler plate housing and is installed in this system in line with the casing. The blower can, however, be placed at either side if the arrangement is improved by such a setup. The blower box also has a special compartment for the receipt of standard size filters. There are eight separate tap connections at the blower control. The engineer chooses the three most likely speeds at which the job will function best and works in these speeds by setting a three-speed switch.

The furnace was placed along side of the chimney breast and immediately adjacent to it. All distributing ducts are rectangular in shape and no duct is over ten inches in depth; whereas most of the ducts are less than eight inches in depth.

A feature of the assembly is a complete panel



This piping plan shows the conditioning equipment in relation to the basement and the first floor rooms above. Direct return is made from the first floor; pipes are placed between joists or made flat to conserve head room; and two new basement rooms are made available. Automatic operation with gas also eliminates a fuel room—now made into a den

NO.	ROOM	DIMENSION	CUB. CONT.	C. F. M.	BSMT. W. A. 200 BTU/sq.ft. (1.1)	GLASS ( )	WALL ( ) (2.5)	CEILING FLOOR ( ) (2)	INFIL. ( ) (.02)	TEMP. DIFF.	B.T.U. LOSS
1	KITCHEN	9⁶ x 15 2 x 5	1296		43	20	247	—	1944	70°	8610
2	DINING	13 x 16	1768		59	58	205	—	2652	"	11760
3	LIVING	14 x 20 6 x 6	2686		124	137	373	1 36	5372	"	24850
4											
5		8'2" CEILING									
6											
7	BATH	6 x 8⁶	417		30	10	110	51	626	"	4340
8	BR #1	12 x 14⁶	1421		52	20	196	174	2131	"	10430
9	BR #2	11⁶ x 14⁶	1362		55	35	177	167	2043	"	10990
10	BR #3	11⁶ x 14									
11		4⁶ x 6	1535		54	31	185	188	1842	"	10850
12			10485		417						81,830

8'6" Ceiling for First Floor

C.F.M. Required = .013 x 81,830 = 1064 C.F.M.
No. 424 B Keystone Gas Fired Air Conditioner @132,000 B.T.U. Input (99,000 Output; A.G.R. Rating) Equipped with No. 30 Emerson Blower

The calculations used in designing the new system are shown on this data sheet.. How well the system has functioned is shown on the test sheet reproduced below

control board which comes as a part of the general unit. It is only necessary to run the thermostat wires and make a hot line connection to the panel board. Another simple connection from the control board to the blower motor, and a connection from the limit control in the bonnet of the heater to the same control board, completes the installation of all electrical control apparatus.

The plumbing connections require only the tapping of a flexible humidifier line from a cold water supply to the solenoid valve on the control board; as well as the customary gas line for a gas fired job.

Those of us who have been installing forced air systems for several years will always remember the troubles with air flow through furnace casings. We have found that this trouble is due first, to improper baffling and, second, to the fact that all or part of the air is passed too rapidly over the heating surfaces for adequate heat pick-up.

The "Wind Box"

On the Crawford installation we used the special "wind box" which the furnace manufacturer has developed to insure uniform air flow. This wind box is placed on the inside of the furnace around the base. It has an inlet direct from the blower, and follows the contour of the steel drum all the way around to the front on each side. The only outlet from this wind box is a series of elongated openings on the upper side of the box, so engineered as to cause the air to be blown directly against the heating surface of the steel drum proper. Anemometer and temperature tests on the Crawford furnace show air flows and temperatures to be practically identical at all points on the casing.

One of the original conditions most objectionable to the Crawford family was the lack of proper humidity. We therefore took particular care to see that the humidifying apparatus and control would be adequate and certain in their function.

Humidity is automatically controlled by means of a humidistat located on the first floor. This instrument is very sensitive and can be set for any desired percentage of humidity by the simple expedient of turning a button to the desired point. The humidistat controls a solenoid water valve which, in turn, opens or closes the water supply to the humidifier proper.

Humidity is given to the moving air in the form of a fine spray located in the bonnet of the heater. This operates in series with the blower and is shut off when the blower is not in operation. It comes on as soon as the blower contact is made on the assumption that there is additional need for humidity in the house. It likewise automatically shuts off when the desired percentage of humidity is reached in the house.

An overflow pan is provided below the spray in order to take care of emergencies and also to prevent

SCHWARTZ FURNACE CO.
PITTSBURGH, PA.

O P E R A T I N G T E S T

KEYSTONE AIR CONDITIONER
AT
JOHN E. CRAWFORD RESIDENCE
2438 PIONEER AVENUE
PITTSBURGH, PA.
DEC. 2, 1932

EQUIPMENT: - #424-B Keystone Air Conditioning Assembly; gas fired.

OBSERVERS: - C. B. Lockhart & B. L. Schwartz.

ROOM	READINGS VEL. F.P.M.	TEMP.	REMARKS
Living - Reg. near door	400)		
Room - " away from "	380)	75°	The Dampers were slight-
Dining Room	125	75°	ly closed to Living Room
Kitchen	100	74°	and Dining Room at con-
First Floor Hall	200	--	clusion of Test. (No
Front Bedroom - Left	250	73°	further readings taken
Front Bedroom - Right	240	72°	as house was too warm.)
Rear Bedroom	360	72°	
Bath	250	73°	

Thermostat Located in Dining Room.
Hall Cold Air Temperature at Floor Line... 73°
Dining Room " " " " ... 73°
Outside Temperature - 45° F
Gas Input at Meter = 135 ft./ hour.
BLOWER SPEED
Inside taps 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8
o - o - o - o - o - o - o - o
3 Speed Snap Switch.
1310 CFM 940 CFM

The test sheet shows excellent heat distribution, absolutely no floor or hall drafts and control of the critical room—the dining room—where the thermostat was located. The dining room was chosen as the most exposed room with the largest glass area

the spray from blowing directly against the heating surface.

The thermostat and humidistat were located in the dining room, rather than in the living room of this particular residence. Our reason for this lay in the fact that the dining room faces the northwest and has an unusual amount of glass; whereas the living room is more protected. It was therefore thought that the dining room would be more responsive to outdoor weather conditions. Experience proved that good judgment was used in this analysis.

Sell Useable Basement Space

It is our firm contention that the air conditioning contractor has one real closing argument for forced air—the argument of additional and useable basement floor area. So much more room was made available in this installation that Mr. Crawford had the entire basement floor completely covered with beautiful tile block. This includes a tile curb on all four sides, giving it a rich, finished appearance.

The former coal bin was converted into a basement den for the exclusive use of John Crawford, Jr., and his boy friends. Although this job is but a few weeks old, a number of parties have already been held in the basement, including a dance for the children. The new installation has not only made the house far more livable and enjoyable than was possible with the old antiquated heating system, but has added another available story to the living quarters, as the basement extends under the entire first floor.

All warm air and return air ducts, as well as the furnace itself, are finished with aluminum paint. This makes a pleasant contrast with the red tile floor and sets the job off like a fine piece of furniture.

And the Owner Said

An interesting customer observation as a result of this job is offered by Mr. Crawford in the following statement:

"In the fall and winter, members of the family suffered successions of head colds largely due to the admission of night fogs through the open windows, but since the installation of this plant, it has not been found necessary to open any windows at night in order to obtain fresh air. The members of the family arise in the morning without the physical discomfort of head colds that seemed to be aggravated by the old heating system, and consequently they seem more alert and completely refreshed by a night's rest with this system."

The entire heating system was engineered and installed by our company.

Our data sheet shows a total heat requirement of 81,830 B.T.U.'s. This is figured on a minimum zero condition. It so happened that a sub-zero spell was encountered in Pittsburgh shortly after the system was put into operation. Mr. Crawford recorded a reading of *nine degrees below zero* during this period immediately outside of his home. He advises that the ladies of the household were very much surprised to learn that it was other than a spring day outdoors, as it was so comfortable inside the house.

Comfort Cooling

(*Continued from page* 36)

methods of securing comfort cooling, namely, by the use of cool water, by the use of ice and finally by the use of some form of refrigerating machine. Cool water, usually from deep wells, must be at least 55 degrees F. in order to give satisfactory results and such water can be found from wells north of Quincy, Ill., St. Joseph, Mo., and Dayton, Ohio, except in the mountains where 55 degrees is found farther south.

Cooling with Water

If cool water of sufficient low cost can be secured the equipment consists of a spray chamber, the necessary sprays and eliminator surfaces, or of the chamber with water cooled piping. In every case of comfort cooling of the whole house or a large portion of the whole house, means must be provided to absorb the heat from the air in the house and to condense the amount of moisture necessary to secure the desired humidity. This may be done by some form of bunker in the basement in conjunction with the distributing ducts of the warm air furnace or by the installation of unit coolers cooled by the cold water pumped from the basement. The water can rise to about 75 degrees and will absorb approximately 20 B.t.u. per pound of water or about 1.2 gal. per minute per ton of refrigeration will be required. Except in the case where the deep well has to be provided especially for the purpose of comfort cooling this method is the simplest of any.

Ice has been found to be entirely satisfactory. With a well insulated ice box the ice will be used only when desired and the investment is normal. If the ice cost is much over $4.00 per ton delivered to the basement, or if the season for comfort cooling is prolonged, the system probably will not be economical. In almost every case comfort cooling is an engineering job and should be considered carefully in regard to the first and the operating costs.

Mechanical Refrigeration

Mechanical refrigeration, using gas or electricity, for the entire house is not a new idea and so it is past the experimental stage. The features different from what has been outlined already are the means of securing cold and these include the motor and the compressor, as a rule, the condenser and the so-called evaporator all connected to form a compact automatic design operated by the temperature control now so usual in heating and cooling installations. The cooling system may be obtained by cooling water or air in the basement in much the same manner as already outlined, or by means of piping for the refrigerating liquid to unit coolers placed in suitable locations usually so that the cool air may be directed horizontally from a position near the ceiling.

The decision for cooling the whole house or a portion of it is an important one. The research house during a 24-hour period of hot weather used a maximum of 4,243 lb. of ice, including the basement loss, in cooling six rooms and the connecting halls, stairs, etc., and an hourly maximum of 220 lb., in addition to the

cost of the power required, and the possible cost of attendance. In many cases such an extreme amount of ice would be hard to justify and one is inclined to investigate whether a portion of the house could not be cooled as a compromise.

In many cases it will be satisfactory if the bedroom can be cooled enough to permit comfortable sleep during extreme weather, whereas in most cases all that is required is the cooling of the living room during the day and evening and the sleeping rooms during the night. Certainly the cost of operation is much reduced in either case, as compared with the cooling of the entire house.

Insulation

It appears that the modern tendency in building construction is to take more care in the matter of insulation, both as regards saving of fuel in the winter and keeping the building cool in summer. Even with ordinary construction as found in the research house there was a lag of from 2 to 4 hours in the actual as compared with the calculated maximum cooling load. The lag would be much greater and the maximum load much less by the use of insulation in the walls, floor of the attic and the roof.

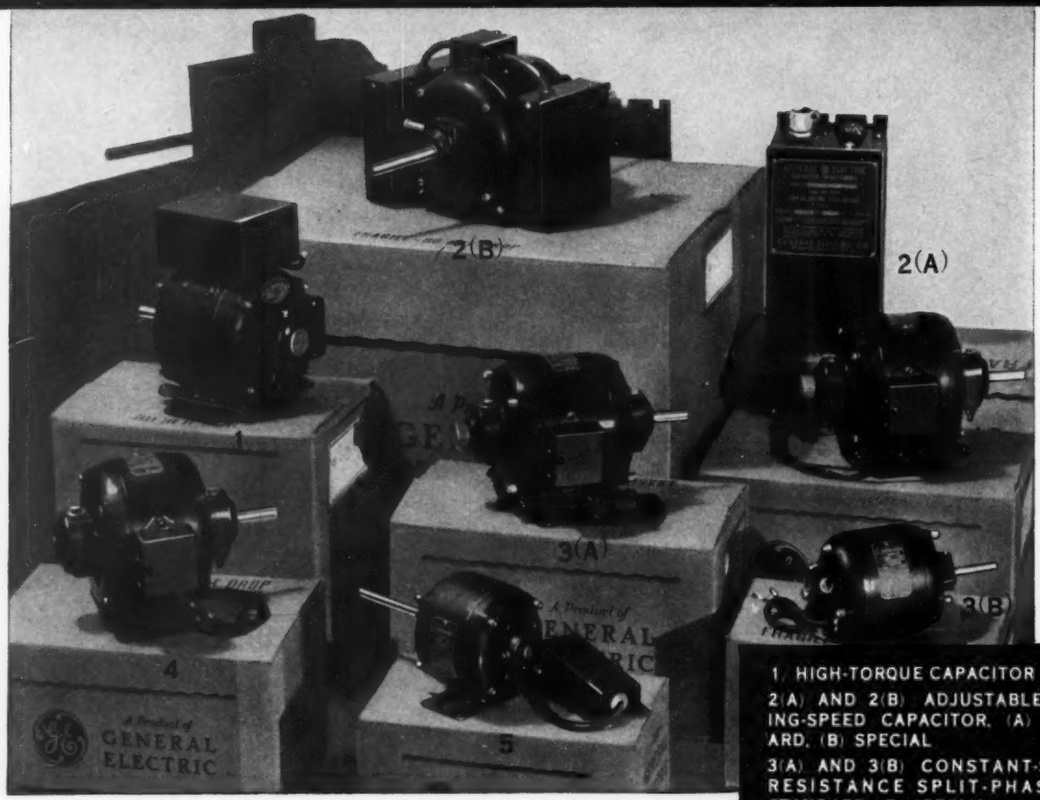
The ceiling below a warm attic behaves like a large panel radiator and adds to the feeling of discomfort. If weather strips are properly installed and the window frames are caulked the loss due to infiltration is much reduced, as compared with the ordinary construction, and the gain due to the use of storm windows is not so apparent. However, storm windows always reduce the loss due to heat leakage and more control is possible when attempting to regulate the moisture content during the heating season. Solar radiation is a factor that has been known for a long time, but probably not emphasized in the northern states. The fact that awnings resulted in a saving of from 20 to 30 per cent of the required cooling load is big enough to warrant their use, especially where the period of intense summer temperature is prolonged.

Effective Temperature

With the emphasis lately on *effective temperature* the idea of dehumidifying instead of cooling becomes pertinent. Tests during the summer of 1932 at the research house indicated humidities varying from less than 40 per cent, for July 15, 16 and 17, during the day to 80 per cent during the night. Undoubtedly certain humid locations, or days that are especially sultry, could be made much more comfortable by decreasing the moisture content in the air. It is debatable whether this will be entirely satisfactory and whether a slight lowering of temperature *as well as* control of humidity is not desired. Reference to tables or charts of effective temperatures will bring out the matter closely. In the case where individual electric refrigerator, air cooled units are used for dehumidifying there is also a rise of the dry bulb temperature which does not make the use of the dehumidifier quite so good.

In the following parts of this series the use of water, ice and mechanical refrigeration for comfort cooling will be gone into. Detailed analysis of equipment, costs and methods of calculating the cooling system will be given.

PACKAGES OF POWER FOR AIR CONDITIONING



1. HIGH-TORQUE CAPACITOR
2(A) AND 2(B) ADJUSTABLE VARYING-SPEED CAPACITOR, (A) STANDARD, (B) SPECIAL
3(A) AND 3(B) CONSTANT-SPEED, RESISTANCE SPLIT-PHASE, (A) STANDARD, (B) SPECIAL
4. CONSTANT-SPEED POLYPHASE
5. PERMANENT SPLIT-CAPACITOR

WHETHER your requirements call for standard or highly special fractional-horsepower motors, in sizes from 1/750 to 3/4 hp., the cumulative experience gained in studying and meeting the needs of users of fractional-horsepower motors makes it possible for General Electric to offer you the *right* motor for the job.

It will pay you to get in touch with a G-E motor specialist. He can easily be reached at a nearby G-E office. Or, if you desire, address your inquiry to General Electric Company, Schenectady, N. Y. Investigate also, G-E transformers, cable, and other electrical necessities.

G.E. builds a line of quiet, dependable fractional-horsepower motors that accurately meets the needs of these and other air-conditioning applications:

Air Filters
Air Washers
Atomizers
Automobile Heaters
Barn Ventilators
Bathroom Heaters
Blowers (All types)
Booster Fans
Bus Heaters
Cabinet-type Units for heating, cooling, humidifying, dehumidifying, washing, and filtering air
Domestic Air Conditioners
Exhaust Fans
Fans
Forced Draft Units
Furnace Fans
Garage Heaters
Humidifiers
Incubator Fans
Industrial Air Conditioners
Kitchen Ventilators
Paint Spray Booth Fans
Propeller Fans (All types)
Railway Car Air Conditioners
Railway Car Precooling Units
Refrigerator Fans
Room Coolers
Rotary Roof Ventilators
Schoolroom Heaters
Special Devices
Unit Coolers
Unit Heaters
Unit Ventilators
Window Ventilators

210-205

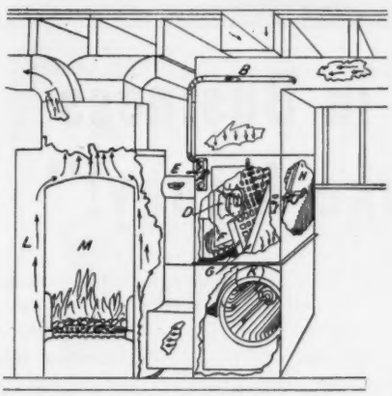
GENERAL ELECTRIC

New PRODUCTS

Nature Air Conditioner

The Nature Air Conditioner manufactured by the Mueller Air Machine Co., Seattle, and distributed by the W. R. Ripley Co., Tacoma, consists of a fan (K) on which is mounted a cabinet for cleaning and humidifying the air of a home. Air is drawn from the return air grilles down through this cabinet by the fan (K) and then discharged over the furnace (M) through the spaces (L).

Humidification is automatic, the home-owner setting the desired humidity on the humidity controller (A). The humidity controller (A) is a diverting valve which controls by diverting a tiny stream of water to the vaporizer (C) when humidity is required or to the drain when enough humidity has been produced. This element is located in a little built-in passage way in the cabinet. A sample of the air



coming down from the living rooms is drawn down a small air pipe (B) so that this air flows over the element continually testing the air for dryness. When more humidity is desired, water from the controller (A) flows to a unique aluminum spinning cup being revolved by a small motor (C). The water is thus broken down to a fine fog in the fog chamber (D). Warm air from the furnace is drawn into this fog chamber through pipe (E). This warm air absorbs the fog and comes back into the main air stream at (F) where it is mixed with the air from the home.

The air is cleaned of soot, grime, dust and lint by being drawn through oiled filters (G). An automatic damper (H) swings open when the filters become sufficiently clogged to be thrown away. As the damper swings open, it moves a pointer located on the front of the cabinet, to a sign "Change Filters" (I), thus giving the home-owner the correct gauge for getting the full use of the filters but protecting him from damaging his furnace by overheating or having his heat interrupted by clogged filters.

◆

Wind-Motor Ventilator

In our March issue we described a new Electro-Wind Turbine ventilator recently introduced by the Allen Corporation, Detroit, Mich.

In describing the operation of the unit we stated—"gravity wind action is utilized until the wind falls below a determined velocity or sets up a down draft. When this point is reached a motor connected to the revolving head is thrown into gear by a clutch and maintains a negative pressure under the head. The on and off cycle is controlled by the clutch which is set to a predetermined wind velocity."

This statement is incorrect.

The actual operation of the unit is as follows: The ventilator operates under wind movement. When it is necessary to remove larger quantities of air the motor is started by a manually operated switch or by a thermostatic control for a temperature setting. The clutch throws out and engages the drum causing the clutch, drum, and rotor to revolve as a unit with an increased capacity of 100 to 200 per cent.

This new ventilator is said to be the first combination of wind and electricity in an efficient ventilating apparatus. The location of the motor outside the head means that the unit can be safely used for exhausting inflammable gases, steam, dust and particle laden air without explosion proof motors.

Complete information on the new unit can be obtained from the Allen Corporation.

◆

New C. A. Face

The Hart and Cooley Manufacturing Co., Chicago, has announced a new cold air face in the size 30 by 6 inches with a rated free opening of 135 square inches. The face will be furnished in black japan, oak, oxidized copper and nickel and brass.

Portable Draft Gauge

A new draft gauge which does not use liquid, which can be set up in 30 seconds and does not require leveling is announced by the Hays Corp., Michigan City, Indiana.

The new gauge can be used in single or double styles and may be used as a portable unit or mounted on the wall or flush in the wall. The new unit employs the same kind of slack leather diaphragm unit used in previous Hays models. The unit is com-

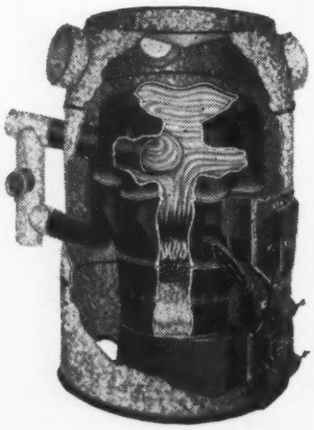
pact with an easily read scale and comes equipped with rubber tubing and nozzle for insertion in the pipe. The unit weighs 4¾ pounds and is 5 by 4 by 9 inches in size.

Information on the unit and how to use it as well as prices may be obtained by writing the company.

◆

New Plastic Mortar

Cobbsment, a plastic masonry mortar for use in building construction, is a new product announced by the Glencoe Lime & Cement Co., 1608 Pine St., St. Louis. The new mortar is said to have such a low shrinkage factor that it can be used in setting flue linings of buildings, brick work in chimneys, and in brickwork on exteriors of kilns, stills, boiler settings, dryers, etc., where temperatures of the mortar do not exceed 900° F.



ATH-A-NOR

the ORIGINAL Smokeless Pipe and Pipeless Warm Air

FURNACE

The Ath-A-Nor Air Blast is one of the reasons why the Ath-A-Nor, the original smokeless pipe and pipeless warm air furnace gives your customers an extra measure of service not found in the ordinary type of furnace construction.

By supplying the proper mixture of air above the charge of coal, the Ath-A-Nor causes a state of combustion which instantly eliminates soot and smoke and extracts from the coal consumed, every possible heat unit.

This causes an actual dollars and cents savings for the user and is one of the reasons why the Ath-A-Nor continues to be in popular demand.

Write for the story of the savings that are so important to Ath-A-Nor users and tell your customers about them. Also learn about the Akron Air Blast and the Solid Comfort, other furnaces in a line that has been a standout for the past 43 years.

The MAY-FIEBEGER Co.

NEWARK OHIO

EVERYTHING FOR THE WARM AIR HEATING TRADE

ARMCO on the Air WLW Friday Nights—8 to 8:30 E. S. T.

"I'm in Business to Make Money!"

"I take Armco Ingot Iron, add to it a heaping measure of careful workmanship, and *sell* my work for a reasonable though *profitable* price. My customers like it because they know I am not putting in 'just another job,' but rather an installation that promises them years of trouble-free service. That's why I say: I'm in business to make money." . . . . You, too, can make money with Armco Metals. Let us show you how. See your nearest Armco Distributor—or write directly to us.

THE AMERICAN ROLLING MILL COMPANY

Executive Offices: Middletown, Ohio
There's an Armco Distributor Near You

ARMCO

SHEET METALS *Create Profits* **out of Customer-Satisfaction**

Each month that helpful paper, "Ingot Iron Shop News," offers you ideas and suggestions on how to increase sales, cut costs, and turn out work that's pleasing to customers and profitable for you. Published by the Armco Distributors' Association. Write for your free subscription.

(*Continued from page* 30)

should lead ultimately not only to saving space but in several respects, to lower construction costs."

Dangers

Lest the air conditioning industry suffer reverses experienced in other industries, perhaps a friendly note of warning should be sounded. The radio and oil burner industries are instances in point. Hundreds of people went into the business of manufacturing and installing of oil burners who knew nothing about the technical requirements of a heating system and thousands of people soon became dissatisfied with their purchases to the loss and detriment of all concerned. There is a distinct danger of repetition of similar experience in respect of domestic air conditioning unless reputable manufacturers and contractors guard against it in advance.

The science of air conditioning is much more complicated than that of heating alone and public understanding of what is involved and what may be expected from good equipment is not developed. It would be in the interests of the public and the industry alike if standards of manufacture and performance could be established by an authoritative independent body and made widely known, as was the case, eventually, in the oil burner industry.

A movement is at present under way to prevent exaggerated claims being made for products and to make clear in the public mind the difference between "air treatment" for domestic purposes and "air conditioning" as known in various industries. Or perhaps since the term "air conditioning" has come into such common usage, a better distinction is that of *Summer Air Conditioning* and *Winter Air Conditioning*. Year 'round air conditioning involves not only (1) controlled circulation, (2) purification, (3) heating, (4) humidification, (5) cooling and (6) dehumidification, but also scientific coordination of all six functions, 1, 2, 3, and 4 constituting winter air conditioning, 1, 2, 5 and 6 summer air conditioning.

The field of winter air conditioning being so vast in itself, it is only natural that the attention of the heating and sheet metal industry should first be turned in that direction because installations of this character are entirely practicable and within the reach of the average pocketbook, while summer air conditioning is still in the early stages of development and will probably not come into general domestic use for several years, due partly to the fact that to cool in summer with equipment thus far available is considerably more expensive than to heat in winter and the further fact that a great deal more time is spent indoors in the winter time.

Contractor's Opportunity

A wonderful opportunity lies before the sheet metal contractor, because he is fitted by experience for the kind of work of which an unlimited amount will be required in connection with air conditioning installations, every job having to be practically "tailor made" thus providing additional work for the local shop as it is far more practical to make up the ductwork locally to exactly meet conditions than to attempt to use ready-made material.

Now, while it is quite true that air conditioning rightfully belongs to the sheet metal and warm air heating industry, the sheet metal contractor cannot hope to hold this business for himself merely by virtue of his installation ability, for in order to capitalize this opportunity and in order to avert the possibility of increased competition from others entering the field, he must get squarely behind air conditioning and *push* it; particularly must he concern himself with the selling or "merchandising" angle of air conditioning.

Association Activities . . . .

Philadelphia Meeting

The January 27 meeting of the Roofing, Sheet Metal and Heating Engineers of Philadelphia was given over pretty largely to a discussion of the assocations growth and aims led by Fred Ritter, secretary.

Mr. Ritter reviewed the expansion from the time some thirty years ago until 1927 when the present plan of individual help on business and bookkeeping problems was inaugurated. The speaker then explained the results of the first survey of the city which plainly indicated the need for skilled bookkeeping, assistance on calculating costs and making a profit and how the associations plan had worked out advantageously for dozens of members.

Mr. Ritter and others expressed confidence in the future growth and growing value of the association. In conclusion a talk on overhead, labor and material costs, was given with lantern slides.

◆

Group Hears About Filters

The interesting photograph is a group of warm air furnace dealers and other individuals who attended the meeting in the Auditorium of the A. Y. McDonald Mfg. Co., of Omaha, Nebraska, on February 2nd. This group was called together by B. G. Peterson, manager of the Heating Dept., of the McDonald Company, for the purpose of listening to an address on "Air Filters, Their Construction and Uses." The address was made by Mr. F. L.

Myers, of the Industrial Materials Division, of the Owens-Illinois Glass Company, Toledo, Ohio.

This impressive group explains why Omaha is out in front on the installation and sale of air conditioning equipment, since the attendance represents the efforts of Mr. Peterson on a telephone for about one hour.

◆

Flat Rolled Mfrs. Move

The National Association of Flat Rolled Steel Manufacturers have moved their office to room 565 Frick Building, Pittsburgh. The move was made on March 4, 1933.

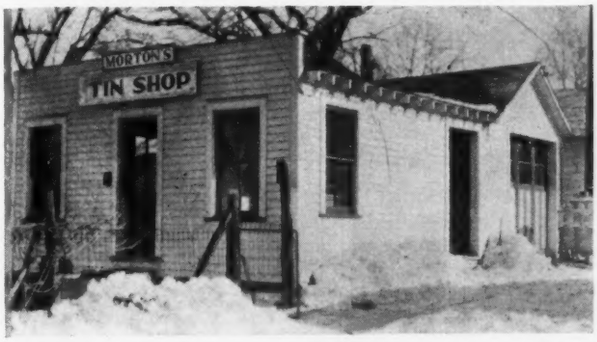
◆

Schreiner Heads Michigan Auxiliary

A. G. Schreiner, assistant sales manager of the Detroit district office of Republic Steel Corp., was elected president of the salesmen's auxiliary at the annual meeting of the Michigan Sheet Metal & Roofing Association in the Winona Hotel, Bay City, February 28th, March 1st and 2nd. Other officers are R. G. Mahoney of the Chase Brass & Copper Co., vice president; Alfred A. Green of the National Lead Co., secretary and treasurer and John R. Lumm of Revere Copper & Brass Co., sergeant-at-arms.

A fairly good attendance made up of contractors and salesmen was on hand. Regular business was transacted and was followed by the annual banquet and entertainment.

With Our Readers . . . . . .



Advertises with a Model House

For many years Walter Morton of West Chicago, Ill., was shop and field superintendent for some of the largest sheet metal and furnace contractors in the middle west. His experience in the heating and sheet metal fields goes back some 30 years. And he has read AMERICAN ARTISAN all those years.

In 1928 Walter Morton decided to go into business for himself and built the shop shown on the back of his home lot. Since that date he has completed many excellent furnace and sheet metal contracts, some of the sheet metal jobs being the best known in the Chicago area.

Mr. Morton is one of the real old timers who grew up in the days when a journeyman had to know everything about metal working. As a result he handles metal working tools as a cabinet maker uses woodworking tools.

The little house shown herewith was made by Mr. Morton during spare moments in a month's time. The outside is galvanized iron with the siding made in individual pieces soldered on the inside. Three types of copper roofing is used—copper shingle, roll and batten—with each roll or shingle made separately. Door and window frames are all hand made in separate pieces as are the sections for the porches, chimney, bays, etc.

Although Mr. Morton built the house for fun, he has used it since as an advertisement by showing it in downtown store windows in several suburban towns around West Chicago.

News Items . . . . . .

George Thesmacher Dies Suddenly

The entire warm air heating and sheet metal industry will be shocked to learn of the sudden death March 24 of heart disease of George Thesmacher, treasurer of Riester & Thesmacher, one of the largest sheet metal firms in the country.

Mr. Thesmacher's death was entirely unexpected. He had retired cheerful and in seeming good health after entertaining a number of friends. At the National Sheet Metal Contractor's Meeting in Detroit he expressed confidence in business pickup and enjoyed the time spent with old friends in the industry with all his boundless enthusiasm.

The industry loses in George Thesmacher's death one of its real leaders; a man who always held the advancement of his craft above all else, who thought straight and said what he meant and who refused to accept defeat in the face of trouble.

Mr. Thesmacher was born in Oldenburg, Germany, in 1873, went to Cleveland at the age of 15 and entered the sheet metal trade, where he met A. E. Riester with whom he formed a partnership in 1900. He had been president of the Rotary Club, member of the executive committee of the Building Trades Employers Association since its formation; was a former president of the National Sheet Metal Contractors Association, a former director of the Builders Exchange and the Chamber of Commerce, and was a member of the Athletic Club.

He is survived by a son, Milton A., secretary of the company, and a daughter, Pauline, both of whom made their home with the father, and two brothers, John of Carthage, Ill., and Adolph of Statien, Germany.

◆

Death of Arthur Symonds

Arthur Symonds, of the Symonds Register Company, 3117 Minnesota Ave., St. Louis, died Tuesday, March 7 after an illness of four weeks. Mr. Symonds was associated with his father Herb Symonds ever since his boyhood.

Arthur Symonds is survived by his widow, Mrs. Elsie Symonds and two boys aged 18 and 11 years. Burial was March 10 in St. Louis.

The furnace industry loses with the passing of Arthur Symonds one of the younger men who are now taking over the burden of heating America's homes. He leaves a host of friends in his home city, among the members of the Missouri and Illinois state associations and the industry at large.

◆

U. S. Register Price List

The United States Register Co., Battle Creek, Mich., has a new discount sheet effective January 1, 1933. The list covers the company's entire list of items. The company also has ready for mailing a new leaflet describing their Trussteel face. Copies of either or both leaflets can be obtained by writing the company.

◆

Lau Heating Service Catalogue

Lau Heating Service, Inc., 3116 North Main St., Dayton, Ohio, will mail to interested contractors or manufacturers their newest catalogue showing and describing the line of blowers and assemblies.

The products are sold either with or without casings. The catalogue describes such features as the cushion drive, three point motor load distribution and cradle assembly.

News Items . . . . . .

Gilt Edge and Fireside Ownership

For the information of the furnace trade, A. G. Pomrening, Vice President and Sales Manager of the Schwab Furnace and Manufacturing Co., 522 Cherry St., Milwaukee and 123 Gilt Edge Ave., Cedar Grove, Wisconsin, announces that both the Gilt Edge and the Fireside furnaces are being manufactured exclusively by the Schwab Furnace and Manufacturing Co., and by no other concern.

◆

Model Houses for Fair

Construction of exhibit houses and the special exhibition buildings in the Home and Industrial Arts Exhibit of Chicago's 1933 World's Fair is being speeded so that every structure and exhibit will be complete and in place on opening day, June 1.

On February 15, the exhibit houses and three exhibition buildings in the show under way were the American Rolling Mill-Ferro Enamel Corporation house, the Masonite house, the Stransteel house, the Moore "Designed for Living" house, the Common Brick Manufacturers house and Home Planning Hall, the Johns-Manville Building and the Southern Cypress Manufacturers Building, the Rostone-Indiana Bridge Co. house, the Lumber Industries house, the home which General Houses, Inc. will build, and the special house which the State of Florida will erect.

◆

New Steel Jobber

Thomas W. Henry and Arthur R. Thoren have organized the firm of Henry & Thoren to do a general sheet jobbing business. The new firm's headquarters will be Jamestown, N. Y., where some 12,000 square feet of storage space has been leased.

Both members have been identified with the steel business for many years, particularly Mr. Henry, who was connected with a large steel producer in the Pittsburgh district for many years.

◆

Follansbee Personnel Changes

The Follansbee Bros. Co., announce that David S. Gaston formerly in charge of branch warehouses, has been appointed sales manager for tin mill products. J. C. Kilroy, formerly sales manager of tin plate, has been appointed sales manager of the jobbing department.

◆

Joins Hurley Machine

Joseph M. Chaney, for ten years vice-president in charge of sales for Ditto, Inc., has joined Hurley Machine Company, Chicago, as head of the company's air conditioning division.

◆

Rudy Furnace Co. Buys Betts & Cole

Rudy Furnace Co. announce the purchase of Betts & Cole Heater Co., of Marshall, Mich., manufacturers of hot water tank heaters and incinerators.

Founded in 1931, Betts & Cole's operations will be consolidated with those of the Rudy Company and products will be marketed under the Rudy name. The Marshall plant of the Betts & Cole Company will be released and equipment, stock and other assets moved to Dowagiac.

Everett D. Betts, widely known foundryman, designer and head of the former Betts & Cole Company, will join the Rudy organization.

News Items . . . . . .

Sheet Metal Man Is Author

For several months past, the Athens, Ohio, "Messenger," leading newspaper, has carried a series of articles discussing present and past problems in relationship with southeastern Ohio. These articles have attracted considerable interest with numerous readers writing to the paper asking who the author is and what background he possesses which enables him to write so interestingly.

As a result of inquiries the newspaper announced recently that the author L. C. Nye, is no other than the L. C. Nye who has been a sheet metal contractor in Athens for many years. The paper describes Mr. Nye as follows:

Metal worker by trade, Mr. Nye since boyhood has made a hobby of saving old newspapers and clippings of unusual events.

Before he reached his majority Mr. Nye became a sheet metal worker after learning his trade from C. A. Cable, Nelsonville, and then entered business for himself in Trimble in 1891. He remained in Trimble four years, going to Bremen in 1895 where he remained five years and then established a business in Athens. For years he was widely known as a manufacturer of gas stoves.

◆

Ambler Furnace & Fdry. Co. Sold

Ambler Furnace & Foundry Co., Northville, Mich., has been acquired by new interests, headed by Henry Chambers. Company name will be changed to Independent Furnace & Foundry Works, and improvements made.

◆

Heimovics to Manage Milcor, Kansas City

Officials of the Milcor Steel Company have recently announced the appointment of George E. Heimovics as Manager of the Kansas City Plant. He succeeds Hugo Siefert in that position. Mr. Siefert resigned, effective February 1st.

Mr. Heimovics has been working for the Milcor Steel Company since October, 1923. He represented the company traveling in Colorado, Kansas, and Nebraska.

The Kansas City Plant of the Milcor Steel Company is one of the most modern and up to date plants of its kind in the country.

◆

Milcor Buys Richto Metal Trim Co.

Milcor Steel Co., 4100 West Burnham Street, Milwaukee, manufacturer of steel building supplies, has acquired Richto Metal Trim Co., Aurora, Ill., to round out present fireproofing line. Richto plant is being transferred to Milwaukee and O. G. Taecke, general manager, will become manager of metal trim division of Milcor company. Louis Kuehn is president.

◆

J. E. Holman Joins Barnes

J. E. Holman, well known in the sheet metal industry, has just joined the organization of the Barnes Metal Products Co., Chicago manufacturers, in the capacity of managing director.

W. J. Ahern, who has been sales manager for the Barnes Company, has been appointed assistant to the general manager and will continue to act as director of sales.

No changes in the Barnes sales policy are contemplated, but a program of expansion will be undertaken.

New Literature . . . .

An Unusual Selling Help

Many sorts of premiums and plans have been used to interest the home owner. Today any good, new, legitimate plan, to secure home owner interest and good will, for home heating and air conditioning equipment, should greatly interest the dealer.

To our knowledge the Hess Warming & Ventilating Company, 1211 S. Western Avenue, Chicago, Ill., is the first concern to offer a cook-book. The Hess Company claims a very pleasing reception has been accorded the books and that it has secured for them and their dealers an excellent business return. The recipes are said to be of unusual merit and as such, please all members of a household. The book is attractively arranged, with some advertising on each page and is intended to act as a lasting advertisement in the homes where it has been presented. The book is not intended for broadcast handouts, but is to be used by salesmen in their endeavors to secure interviews and dig up furnace prospects.

◆

Ventilator Leaflet

A new leaflet describing the entire line of ventilators manufactured by the Burt Manufacturing Co., Akron, Ohio has been prepared and will be mailed to any interested contractor upon request to the Burt Company.

The leaflet contains six pages showing the various models and explaining their particular use. Tables and charts are also given to explain sizes and capacities. Each ventilator is explained in complete detail. Suggestions on the proper application and erection are also given.

In addition to ventilators the leaflet also describes the company's line of louvres, exhaust heads and oil filters.

◆

Arc Welding Book

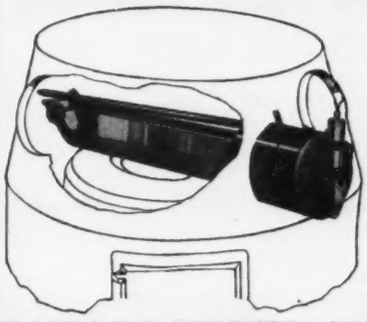
Cutting costs by redesigning is the theme of a new book—"Designing for Arc Welding"—which contains prize winning papers submitted in the $17,500 Second Lincoln Prize Competition.

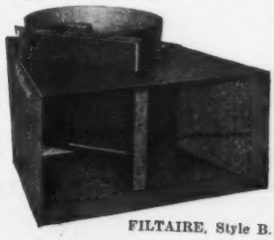
The book consists of approximately 450 pages, divided into five sections as follows: Part I—Machinery; II—Shipbuilding; III—Buildings-Bridges; IV—Large Containers; and V—Piping and Fittings. In every case, the fundamentals of the design are so explained as to make them applicable to other industries.

Every chapter of the book is written by an authority in that particular field. The papers cover the subjects in great detail and are illustrated with hundreds of drawings and photographs.

One of the principal points on which the papers in the competition was judged was the savings in costs made by the use of arc welding. Each paper gives actual costs and shows how the savings were effected.

The book is bound in cloth-covered boards and published by The Lincoln Electric Company, Cleveland, Ohio. It is sold for $2.50.





New Literature . . . .

The New Guide Is Out

THE GUIDE 1933 is just off the press. This 11th Annual Edition of the standard reference volume on heating, ventilating and air conditioning appears in an entirely new "dress" and the contents have been extensively enlarged and revised to include the latest results of research and modern engineering practice. Compiled by the foremost engineers in the profession, THE GUIDE 1933 embodies in its 45 chapters not only the data developed at the Society's Research Laboratory and cooperating institutions, but also the most practical and useful ideas of outstanding engineers in the profession.

The Text Section of THE GUIDE 1933 contains 608 pages, supplemented by 180 pages of Manufacturers Catalog Data with an Index to Modern Equipment, also 64 pages of the Society's Roll of Membership.

Eleven new chapters are to be found and extensive changes are to be noted in the other sections which have been retained. Chapter 3, dealing with Transmission Losses, presents an entirely new set-up of tables with coefficients of transmission based upon the latest investigations of the Society's Research Laboratory in Pittsburgh and the most recent data obtained at the Experimental Engineering Laboratories of the University of Minnesota.

The Society's new Ventilation Standards, adopted in 1932, are included in THE GUIDE with other important data in Chapter 22, relating to Ventilation and Air Conditioning for Comfort and Health. Much of the information came from cooperative studies at the School of Public Health, Harvard University. Considerable information heretofore unpublished will be found in Chapters 24 and 25 and the data on Air Duct Design (Chapter 33) has been amplified and made more useful by the introduction of more complete examples, showing the methods of determining accurate duct sizes. The section describing Test Instruments and Methods (Chapter 39) is new material. Chapter 36 is devoted to Natural Ventilation and presents new data. Among the chapters, which have had extensive revision are Chapter 4, Infiltration Heat Losses; Chapter 6, Radiators and Gravity Convectors; Chapters 9 and 10 dealing with Steam Heating Systems; Chapters 16, 17 and 18 dealing with Fuels and Combustion; Chapter 38, Fans and Motive Power; and Chapter 43 on Smoke and Dust Abatement.

◆

Homer Increases Production

Homer Furnace & Foundry Co., Coldwater, Mich., has increased production schedule to a five-day week basis and reinstated a number of operatives.

CLASSIFIED ADVERTISING

4 cents for each word including heading and address. Count seven words for keyed address. Minimum $1.00 for each insertion. One inch $3.00. Cash must accompany order. Copy should reach us eight days in advance of publication date.

BUSINESS CHANCES

LIGHTNING RODS

Dealers who are selling Lightning Protection will make money by writing to us for our latest Factory to Dealer Prices. We employ no salesmen and save you all overhead charges. Our Pure Copper Cable and Fixtures are endorsed by the National Board of Fire Underwriters and hundreds of dealers. Write today for samples and prices. Address L. K. Diddie Company, Marshfield, Wis.

SITUATIONS WANTED

SITUATION WANTED—ALL AROUND sheet metal worker and furnace man. Prefer Wisconsin, Michigan or Illinois. Available immediately. Address Key 167, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

TINNER, FURNACE AND ROOFING man wants position anywhere west of Mississippi River. Twenty-one years' experience. Have run shop for seven and one-half years. Married and does not drink. Also complete set of tinner's tools for sale. Address Key 220, "American Artisan," 1900 Prairie Ave., Chicago, Ill.

SITUATION WANTED—WOULD LIKE A position in central or southern Wisconsin. Have had over twenty years' experience in furnace and plumbing work, electric wiring, pump and wind mill work and all lines that come into a small town hardware store. Married and willing to work for reasonable wages, if steady with a future. Address Key 219, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

SITUATION WANTED—BY AN ALL around sheet metal worker; one who can handle all branches of the trade as well as plumbing, steam and hot water heating. Have had 22 years' experience and can run shop, estimate and sell. Prefer connection with hardware store doing this line of work or one who is planning on it. Can furnish references as to character and ability. Address Key 218, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

TINNER AND FURNACE MAN WANTS steady job, any place. I can lay out, figure and estimate. Cut own patterns and assemble same. Would like to hear from some reliable firm. Small town no objection. I can also do plumbing. Write for further details. Address J. R. Alexander, 1006 Coolbaugh St., Red Oak, Iowa.

SITUATION WANTED—BY AN EXperienced tinner, plumber and hardware clerk. Small town no objection. Will work on salary or operate shop on percentage basis. Have operated shop for myself for 16 years. Central west, Pacific coast or Colorado preferred. Address Key 222, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

SITUATION WANTED—HAVE HAD 25 years of experience as tinner and plumber. Am qualified to do work in the following lines: auto radiator repairing, erecting steel ceilings, pump and windmill repairing, steam and hot water work, installing radios, and any kind of mechanical job that comes into a shop. Address Key 215, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

SITUATION WANTED—A FIRST CLASS mechanic on tinning, plumbing, steam and hot water and repairing would like to rent or run a shop on commission; prefer one in connection with a hardware store in town of 3 or 4,000 and not too much competition. Am middle age—married. Address Key 214, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

SITUATION WANTED—I HAVE EXCEPtional ability and speed as a sheet metal worker. Able to draw over-pay when work was being done. Have hardware sales experience. Desire connections with hardware store in need of man of such ability. Over fifty, married—and A-1. Reputation for honesty, sobriety and ability. Address Key 216, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

FOR SALE

FOR SALE—A USED BAKER FURNACE cleaner. Write for details. Address Baker Furnace & Cleaner Mfg. Co., 2507 Albion St., Toledo, Ohio.

FOR SALE—IN SOUTHERN MINNEsota, first class sheet metal and heating shop, priced right, rent reasonable, run in connection with plumbing and electrical shop. Address C. W. Greenwood, Jackson, Minn.

FOR SALE—A PLUMBING AND HEATing business with an electric refrigerator and oil burner agency. Established thirty-three years ago in a prominent city of Wisconsin—population 5,000. Stock has been reduced. Located on Main street in brick building. Five room flat above store. Only one other small dealer in city. Owner died recently; widow will lease or sell. Address Key 217, "American Artisan," 1900 Prairie Ave., Chicago, Illinois.

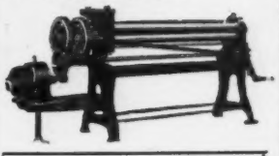
WANTED TO BUY

WANTED—LOCATION FOR A FIRST class sheet metal and tin shop specializing in ventilation, furnace work and general jobbing. Will buy a going shop in a small city in Wisconsin or Minnesota. Must locate on or before June 1st. Will consider a shop in connection with a hardware store if the shop is large enough. Address Key 221, "American Artisan," 1900 Prairie Avenue, Chicago, Ill.

MISCELLANEOUS

Patents and Trade Marks
Philip V. W. Peck
Barrister Bldg., Washington, D. C.

SHEET METAL MACHINERY
COMPLETE STOCKS — HAND AND POWER — NEW AND USED



"Draw on America's Most Complete Stock"

REBUILT BARGAINS

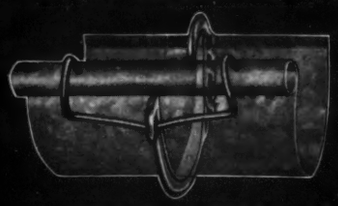
8' Chicago Steel Press Brake Motor Drive with Dies
8' 10 ga. Beloit Power Slip Roll
42" 12 ga. Beloit Slip Roll
36" Nia. Foot Shear.....$55.00
Deep Throat Beader..... 22.50
36"x2" Pexto Slip Roll..... 20.00
No. 82 Nia. Kick Press.... 25.00
Whitney Angle Iron Shear.. 17.50
No. 91 Whitney Bench Punch $25.00
Model A Unishear, 14 ga... 65.00
30" Bar Folder 25.00
Chicago Steel Brakes—All sizes
10' 18 ga.; 10' 16 ga.; 8' 18 ga.; 8' 16 ga.; 8' 14 ga.
Power Shears, 90% new—Pexto 52" 16 ga.; 10' 18 ga.; 62" 10 ga.; Niagara 36" 14 ga.; 10' 14 ga.; 72" 10 ga. gap.

ROLLS—SHEARS—BRAKES—SPOT WELDERS —PUNCH PRESSES—PRESS BRAKES—FOLDERS—DRILLS—HAND MACHINES—STAKES

INTERSTATE MACHINERY CO.
130 S. CLINTON ST., CHICAGO

"BB" QUALITY

Order from your jobber



Saves time and labor

"BB" SPRING CIRCLE CLIP
Furnished only with "BB" Circles at no extra charge over old style straps.
BERGER BROTHERS CO.
229-237 Arch Street, Philadelphia, Pa.

Install **ÆOLUS** *Improved* **VENTILATORS**

FOR industrial buildings, schools, homes, theaters, etc. Made in 14 different metals. Constant ventilation—no noise—no upkeep.

ÆOLUS DICKINSON
Industrial Division of Paul Dickinson, Inc.
3332-52 South Artesian Avenue
Chicago, Ill.

Index to Advertisers

Firms represented in this issue are identified by the folio of the page on which their advertising appears. Advertising which appears in alternate issues is marked with an asterisk.

April, 1933

For Complete Lists of Furnace, Sheet Metal and Air Conditioning Products and Sources of Supply Consult AMERICAN ARTISAN ANNUAL DIRECTORY NUMBER

True Talks

with successful sheet metal men

SERIES No. 3 NUMBER 1

"YES," SAYS THIS CHICAGO CONTRACTOR, "MONEL IS JUST THE METAL FOR GOOD HUMORS!"

Mr. Oscar Johnson, owner of the O. Johnson Sheet Metal Works, Chicago. A pioneer builder of Monel Metal equipment.

This tank designed to hold hospital laboratory solutions was made of 18 gauge Monel Metal by the O. Johnson Sheet Metal Works.

"If you want to keep customers happy, you've got to keep up with the times." That, in a sentence, is the business philosophy of Mr. Oscar Johnson, owner of the O. Johnson Sheet Metal Works, of Chicago. And Mr. Johnson is one of those rare fellows who believes in practicing what he preaches.

He doesn't wait for customers to ask for Monel Metal jobs. If he feels that Monel Metal construction will be to the user's advantage, he never hesitates to urge it. He knows he can trust Monel Metal to keep his promises every time a prospect wants equipment that is rust-proof, corrosion-resisting, easy-to-clean, durable and attractive!

These superior properties of Monel Metal have opened a large and widely varied market which imagination, fabricating skill and good salesmanship have converted into profitable business. Monel Metal equipment designed and built in the Johnson shops is used in well known Chicago hotels, restaurants, hospitals and bakeries. Whether the order calls for a table top or an ice cream vending machine, this company can make it of Monel Metal—and make money on the job!

LEFT: *"Good Humors" ice cream vending machine assembled by the Johnson Company and fitted with Monel Metal ice cream containers, chutes, trim and coin box cover.*

There's no reason why you can't cash in on Monel Metal jobs, too! Write for free sales literature specially prepared for your use.

A sheet metal shop that never knows a dull day is this well-lighted home of the O. Johnson Sheet Metal Works, 173 North Morgan Street, Chicago.

A HIGH NICKEL ALLOY

MONEL METAL

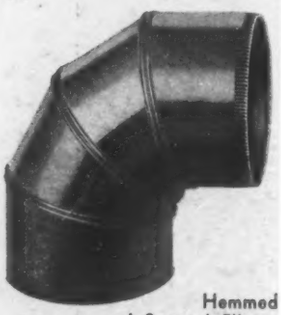
INCO MONEL METAL

NICKEL ALLOYS PERFORM BETTER LONGER

Monel Metal is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. Monel Metal is mined, smelted, refined, rolled and marketed solely by International Nickel.

MILCOR

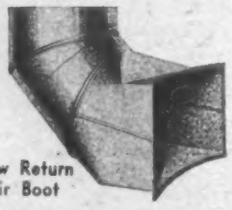
Other New MILCOR Heating Products



Hemmed and Seamed Elbows

Kuehn's Frictionless Tee Joint

Single Piece Stove Pipe Reducer

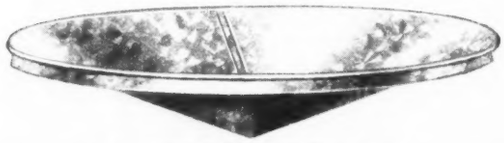


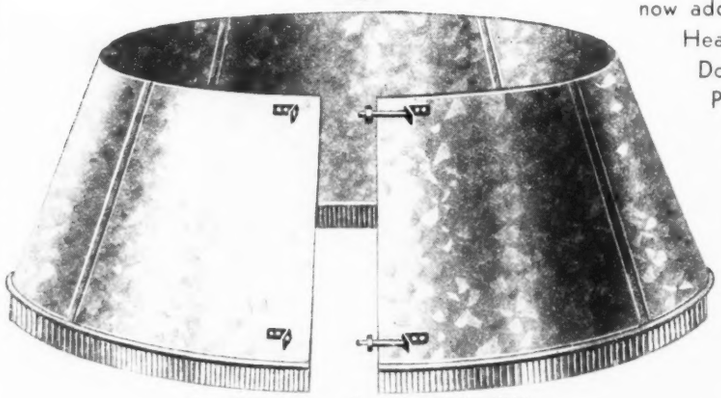
New Return Air Boot

ANNOUNCES

A LINE OF FURNACE BONNETS

A New Product of Real Merit for the World's Finest Line of Heating Materials

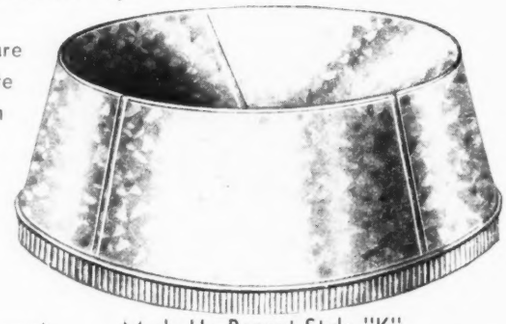




Knocked Down Bonnet Style "K"

These new Furnace Bonnets manufactured in knocked-down and made-up Styles "K" and flat top Style "L" are now added to the great Milcor line of Heating Materials, which includes Double and Single Furnace Wall Pipe—Complete Fittings—Round Pipe and Fittings for cold and warm air—Furnace Accessories—Registers and Faces—Uniform Blue Stove Pipe—Corrugated and Adjustable Stove Pipe Elbows —and Specialties.

The knocked-down feature permits a low freight rate and saves space while in stock. This bonnet can be assembled in one minute and it will be found to have greater strength and rigidity than almost any other made-up or assembled bonnet on the market.



Made-Up Bonnet Style "K"

The special seams provide unequalled strength in both the side and top of the bonnet.

YOUR JOBBER WILL SERVE YOU BEST WITH MILCOR PRODUCTS
MILCOR STEEL COMPANY

Flat Top Bonnet Style "L"

MILCOR STEEL COMPANY

MILWAUKEE, WIS., 4117 W. Burnham St.
Chicago, Ill. Kansas City, Mo. La Crosse, Wis. CANTON, OHIO

Sales Office: New York, 100 E. 42nd Street; Boston, Mass., 136 Federal Street; Atlanta, Ga., 304 Bona Allen Building; Little Rock, Ark., 104 W. Markham Street; Los Angeles, Calif., 7267 Clinton Street.